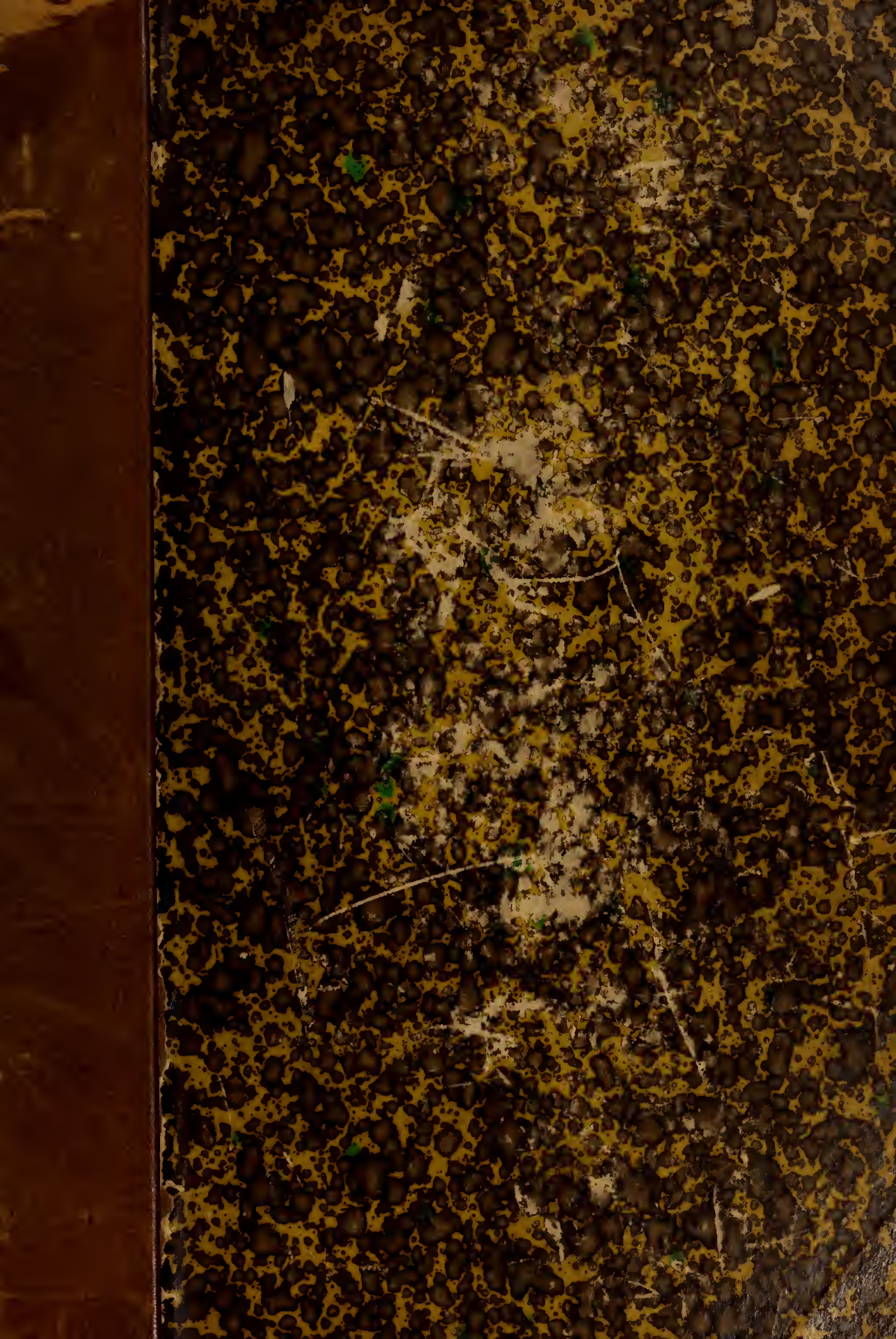

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MANUAL TRAINING AND VOCATIONAL EDUCATION

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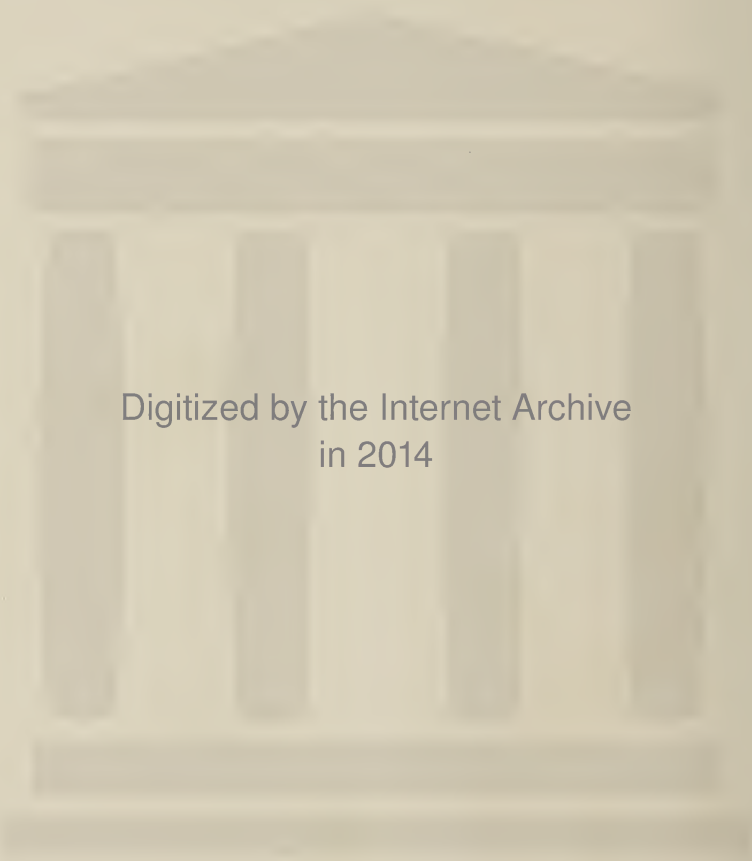

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MANUAL TRAINING
AND
VOCATIONAL EDUCATION

SEPTEMBER, 1914

THE GERMAN *MEISTERKURSE.*

E. George Payne.

THE most recent development of vocational education in Germany has been in the field of secondary education. Various cities have prepared courses for master craftsmen, merchants, managers, particularly managers of small enterprises, and owners of commercial and industrial establishments. These courses are variously named, but the most general designation is that of *Meisterkurse,* the name given the first courses of the kind offered. These originated in Hamburg in 1904, and have gradually spread to other parts of the empire. While the name *Meisterkurse,* or courses for master craftsmen, is most generally given this newer kind of training, the term is not comprehensive enough to indicate the exact nature of the work covered by the courses, including as it does courses for cabinet-makers, joiners, locksmiths, goldsmiths, silversmiths, carriage builders, decorators, sadlers and leather workers, bookbinders, printers, paperhangers, building mechanics, watchmakers, plumbers, gas and water installers, glaziers, wheelmakers, shoemakers, tailors, and the like, on the one hand, and courses in bookkeeping, business affairs and customs, trade practices, banking, credit, contract estimating, price calculation, raw material and completed products, labor supply, business management, etc., on the other hand. In accordance with the plan outlined in a previous article,[1] I wish in this article to discuss principally the commercial aspect of these courses.

The need of additional training for those engaged in the trades and commercial callings of Germany was felt long before any effective effort was made to provide such training. The delay in providing in-

[1]See Vocational Education, March, 1914, p. 271.

struction resulted from difficulties encountered in adapting the courses to the needs of those wishing to participate in them, and in carrying out the main purposes of the work. In the first place, those desiring such additional training adapted to the needs of their business could not avail themselves of a long scientific or technical course of study, for the very practical reason that the giving up of their business management or positions for the time required would mean extreme personal financial loss. They could, however, find time during the slack season to get away for a short period. Consequently a short course was offered to meet the needs of the various industrial groups at the time of greatest convenience to them. The Chamber of Commerce in Hamburg was the first to meet this need by providing practical courses consisting of lectures and demonstrations of the newer and more economical devices and practices. The hearty response which the courses brought forth from the industrial and commercial classes from the first, more than justified the effort expended. Later, courses were offered in bookkeeping, commercial law, civics, and various other scientific subjects related to the practice of the commercial vocations.

The Hamburg courses were established by the Chamber of Commerce of that city, and the example has been generally followed elsewhere, the chambers of commerce or of trade taking the initiative. The chief purpose of the undertaking has been to provide for those actively engaged in commerce and industry the opportunity for technical and theoretical training, the kind of instruction that the present day learner can get in the commercial and trade schools, and the commercial and industrial continuation schools. No effort has been made to develop masters out of apprentices, to train young people in business, or to create industrial and commercial leadership. The function of the courses has been to make men more efficient in the work they are doing, to make them more competent in their own field, to make them happier in their work by increasing their skill in the performance of their tasks. It has been the purpose to show leaders of small enterprises—the grocer, the small shopkeeper, etc.—how they might avoid waste in the conduct of their business, and carry it on more economically and effectively by applying to it better methods—methods developed in recent years and those which they are unable to employ without additional training. The specific lines of improvement have been in special technic, in the use of labor-saving devices, and in the comprehension of advanced business principles learned from observation and imitation.

IMPORTANCE OF WISE SELECTION OF TEACHERS.

The successful initiation and administration of these courses involved the solution of several difficult practical problems. The first one of magnitude which presented itself was that of securing lecturers, teachers, and demonstrators to instruct the classes. Only in very exceptional cases could persons be drawn from the teaching profession. Teachers did not have the intimate practical knowledge necessary to interest those who came from actual business callings and who desired knowledge for the immediate improvement of their business. The Chamber realized from the first that practical knowledge was a more essential thing in these courses than scientific and technical instruction. Consequently it chose for instructors successful business men who possessed, besides their business ability, special aptitude for imparting instruction along business lines. A second problem was that of selecting a place in which to hold the lectures and classes. The rooms of the Chamber of Commerce, being central, were selected, supplied with all necessary equipment, and used for the purpose. This at once gave the enterprise a definite character, as would not have been the case if school buildings had been used. Since the school buildings are used almost exclusively for imparting theoretical and text-book information, the selection of them would have had the psychological effect of discouraging the attendance of those who wished only practical assistance. The selection of a center designed to encourage and improve business provoked a hearty response, for the people felt at once that the courses were of practical value for all classes of artisans, trades, industrial and commercial people, from the laborer to the manager of the large business enterprise.

Altho the primary object of the courses was to raise the standard of individual efficiency among all these classes of workers, as has already been shown, the ultimate aim was broader, and looked to the whole aspect of trade, industry, and commerce as it would be affected by this individual improvement. The Chamber wished so to improve the standard and degree of personal efficiency by means these practical and theoretical courses, that the importation from outside the city and from foreign countries of such things as were produced in the city might be checked or eliminated. The Chamber wished to do this, not by legal barriers, but by improving the home products to such a degree as to meet all outside competition. They wished not only to dominate the home market by raising the quality of the products of the city, but also

to create new markets in the foreign field, as well as to extend those already established. They were convinced that only thru the extension of knowledge and by increasing the ability of all classes could this successful competition be effected.

The means which the Chamber adopted to attain these practical results and to which the instruction was to contribute, were:

1. The introduction of the newest equipment, the latest machines, and a study of the most effective use of such equipment.

2. A study of rational business management, the most effective division of labor, an investigation of the materials used in production or trade, the conditions of the market, the advantages and disadvantages of various completed products, etc., whereby a business, large or small, might best create and retain a permanent circle of patrons.

3. Scientific, technical, and artistic lectures, that the labor might be performed from a higher point of view and that greater pleasure might result to the laborer or producer.

4. Practice in special technic and in the newer methods of the whole industrial activity that the participants upon the courses might be trained in artistic and technical expression.

5. Improvement of the old technic where that was retained, and the introduction and testing of newer methods which had not found their way into Hamburg.

The courses were from two to ten weeks duration, continuing thru ten hours of the day. This plan allowed every one to take advantage of them with the least loss of time to his business. At the same time the shortness of the course gave opportunity to every one to follow other lines than his own and thus acquire a broader idea of his relation to the whole. Also the solution of problems in other lines not only assisted one in his own line, but gave him a deeper appreciation of the work he was doing. The method of carrying on the work required little equipment at first, thus not demanding an impossible outlay before the value of the courses could be determined. This small equipment, used by groups during the various hours of the day, made it unnecessary to provide different equipment for every class. This scheme made possible a beginning in a thoro way with little preliminary outlay. People coming into contact with those in other lines acquired a broader interest which led to studious activity and to investigation outside of the course, and directed outside reading to greater advantage. These general plans, therefore, have been followed during the ten years of the operation of

the courses in Hamburg, which shows how completely the leaders grasped the actual conditions that needed to be met before beginning their work.

CHARACTER OF THE INSTRUCTION.

Some topics selected from one of the courses in business management given in Hamburg will indicate the character and significance of the instruction. The course includes twenty two-hour periods, the first hour of the period devoted to lecture and discussion, the second to practical bookkeeping methods, and to an examination and analysis of business practice. The topics of the course include a discussion of trade rights and the different kinds of trade activities; production and other costs; assets and liabilities; business and personal assets; the boundary line between manufacture and handwork; business bookkeeping; buying of raw material; the selling price of and the actual outlay for raw material; general and productive wages; business capital and its interest value; an analysis of fixed assets and passive outlay for operation, etc. As will be seen, the subjects are those discussed in any text-book on political economy, but in these courses all the subject matter and illustrations are taken from every day business practices.

Space forbids my giving in detail here other illustrations. In 1904 the courses opened in Hamburg with instruction offered in forty-one different lines and with two hundred and nineteen different persons participating. In 1907 twenty other courses, called theoretical courses, were added and the attendance had increased to five hundred. The growth has been gradual since that time, the influence and scope of the work has been extended in the city and elsewhere, and good results felt. The courses added in 1907 were those dealing in concrete problems in economics, civics, commercial law, etc. The extension of the instruction to take in this more theoretical aspect of the work, or "book study" indicates the characteristic growth and the vital significance of work of this kind. It would not have been possible to secure an interest in the study and recitation from books in 1904, but after three years these courses became more popular than the others, because the first courses led to problems the participants were unable to solve without further reading. They, moreover, gradually acquired habits of study and were no longer so dependent upon demonstration and explanation, the more superficial aspect of the work. To this must be added the fact that the latter courses offered something that could not be had from the first.

The progress of Germany in offering courses for those actively engaged in industry, and its outcome in improved commercial methods indicates what might be accomplished in our own country and calls our attention to a vital need. The school authorities and others in the United States have felt this need within the past few years and have in a few places begun to make provision for the need, but have not squarely faced the problem as has Germany. During the past year courses have been provided in St. Louis in automobile and carriage body designing for workers in that field. These courses are given in the public night school, and not in the day time as in Germany. They have met with marked success. Courses have also been provided for several years by the bankers' association for young bank clerks who wish to advance and whom the bankers would like to have more efficient than they are. Courses are given by the Young Men's Christian Association in credit, salesmanship, and other lines. Other cities have made more effective beginnings than those mentioned in St. Louis, but the mere mention of these efforts indicates the paucity of the opportunity for business men to learn what they do not know, and need very much to know, about effective business methods and management. This need appears vital when we learn from such a source as Arthur H. Foote, secretary of the St. Louis Credit Men's Association, that 90 per cent of business failures that have come under his observation and with which he has had to deal in the past ten years have been due to ignorance of simple business principles and practices on the part of the owners and managers—practices that are well established in successful business institutions. These failures, and all the evil consequences, could have been avoided by information which might have been systematically imparted. The need of the prevention of social loss thru business failures is imperative and this along with successful business management must be learned.

CONCLUSION.

In concluding these articles on commercial education in Germany, I wish to recall to the reader the impression that has been dominant in my own mind, and that I have sought to present. This impression, I may say conviction, is that Germany's growth commercially has not been a matter of chance, but the result of a process of conscious education. I have tried to show just how her commercial education has served the

state. This service as rendered to industry and commerce thru trade and commercial schools is summed up in a consular report as follows:[2]

No single cause has contributed more to the industrial development and efficiency of the German nation than the trade schools. Their close connection with the associated industries and their vital importance to the well-being and prosperity of Germany, which is so largely dependent upon manufacturing for the employment of its people, confirms the truth of the famous declaration of Bismarck that "The nation that has no schools has no future." While cheap labor in certain industries has in the past undoubtedly enabled their products to be marketed abroad in spite of high tariffs and the competition of protected industries in foreign countries, the advantages formerly derived from such cheaper production are being gradually eliminated by rising wages in Germany, necessitated by the increasing cost of living and the burden of taxation, by the world-wide growth of the factory system, and the incidental passing of the small workshop and cottage industry, by the substitution of machinery for hand labor, and by the establishment in foreign countries of competing industries in many lines having the advantage of cheaper and more plentiful raw materials. The inevitableness of these conditions has long been recognized by the leading German statesmen and public educators, as well as by the business organizations, trade guilds, and exporting manufacturers, all of whom have been working together to overcome the natural disadvantages under which Germany labors in international trade competition. As in France and Switzerland, the solution of the problem in Germany has been a better scientific, artistic, and technical training of the workers, with the object of raising the standard of German products by the introduction of more originality, skill, art, and economy into their manufacture.

Owing to the technical advancement and the complicated mechanical processes in many trades, there is neither time nor opportunity for learners to get the required fundamental instruction in the factory or shop. Therefore the training for the manufacture of high quality and artistic goods would not be possible without the excellent system of industrial schools established in Germany during the past half century. Germany's export trade is largely dependent upon the efficiency, high standard, and progressiveness of her industries, for which these schools are indispensible. * * * As the profit on high grade and artistic products is naturally greater than on low grade goods, it can readily be understood to what extent the vast and growing export trade and the prosperity of the manufacturing industries is dependent upon the highly skilled artisans and mechanics who have received technical and artistic, as well as, in many cases, practical training in the progressive industrial schools of Germany.

German vocational education is by no means narrowly commercial or industrial and the ideals not merely money making. On the other hand, thru the instinct for acquisition a city pride and national patriotism has been achieved. Moreover, the moral lesson has been impressed

[2]Bulletin of the U. S. Bureau of Education, 1913, No. 54.

upon the people engaged in commerce, thru keeping in mind at all times the fact that commercial honesty is absolutely essential for commercial success. The fact is held ever in mind that service to the public is the only way to increase business, and that honest workmanship is the only kind that wins in the long run. These moral principles are impressed upon the student in commercial schools as they cannot be in the school offering the general courses because of the fact that the commercial courses are connected up with life at every point.

> IT (THE EDUCATIONAL PURPOSE OF THE NATION) STANDS FOR A BALANCED EDUCATIONAL SYSTEM, THE BEST AND BROADEST THAT CAN BE MADE, AND THEREFORE GOOD ENOUGH FOR ALL, IN WHICH EVERY ONE MAY FIND WHAT HE WILL, MAY GO AS FAR AND AS HIGH AS HE WILL; AND NOT FOR A SYSTEM WHICH DIGNIFIES ANY INTEREST OR AIDS ANY CLASS AS AGAINST ANY OTHER. IN A WORD, IT BELIEVES IN SCHOOLS OF EVERY GRADE AND FOR EVERY PURPOSE, WITH EQUALITY OF OPPORTUNITY AND ABSOLUTE FREEDOM OF SELECTION FOR ALL, AND WITH SPECIAL PRIVILEGES FOR NONE.
>
> —Andrew S. Draper.

HOW MAY MANUAL TRAINING RETAIN ITS EARLIER EDUCATIONAL VALUES?[1]

CHARLES A. BENNETT.

THIS question may be said to imply that with the existing pressure upon manual training to serve other than its original purposes it is in danger of losing "earlier educational values" that are real values and should, therefore, be retained. The question does not define the character of this pressure, so it will be assumed that this pressure comes from three sources:

1. From those who wish to see manual training become more distinctly vocational in character.

2. From those who would make manual training chiefly a vehicle for teaching applied art.

3. From those who seem to believe that a shop organized as a producing factory will give better educational results than a shop organized as a school.

Taking it for granted, then, that this pressure upon manual training for change is fairly represented by these three propositions, it now seems desirable to state rather definitely some of the characteristics of manual training instruction which resulted in the earlier educational values which should be retained. They are:

a. *Methodical Doing.* The early work in manual training, whether it received its impulse from Russia or Sweden or France or from American practice in the mechanic arts, was characterized by methodical doing. It was assumed that there was a best way to accomplish a desired result and that way was taught. The material end was clearly seen by the teacher, and the steps to that end were taken by each pupil in the order designated.

b. *Analysis of Process.* The steps taken in the teaching of a process were gained from an analysis of that same tool process as it appeared in practical work. They were therefore taken direct from industry.

[1]Paper read at the Milwaukee meeting of the Western Drawing and Manual Training Association.

c. *Fundamental Processes Selected.* In determining which tool processes to subject to this careful analysis the most fundamental were selected.

d. *The Best Technic.* As great care was taken in selecting the tool process, so great pains was taken to teach that process according to the best standard of technic.

e. *Study of Construction.* The same principles of selection and analysis that were applied to tool processes were also applied to the study of construction.

f. *Working Drawings.* Whether the instruction was merely on tool processes or involved construction, all work was done from carefully prepared working drawings.

These six characteristics are mentioned as being vital in the earlier work in manual training. The question before us, then, is, how can these be retained under the pressure upon manual training that is coming on account of (1) the vocational demand, (2) the applied art demand, (3) the claims of the factory method of instruction?

I. THE VOCATIONAL DEMAND.

The problem of vocational training is a large and many-sided one. In fact it is so large that no one should expect to find its complete solution in the manual training shop, yet whatever is taught in the manual training shop should be in direct line of preparation for more specific vocational training which may be given later either in a school or in a factory. In its best form, manual training looks toward quite a large fraction of the occupations for which vocational training is needed, because it deals with the greatest constructive materials of industry—wood and metal and clay and fiber, which furnish shelter and clothing and machinery and books. It is difficult to tell where manual training should end and vocational training begin. It is probably far better to say that there is not such ending and beginning, for the two are knit together as one fabric.

The general demand for vocational training is evident enough, but only in a few industries is it yet clear just exactly in what that training should consist. Before anyone can speak with certainity in reference to any industry he must have made an analysis of that industry. He must have found out into what natural subdivisions the industry divides itself, what is most vital in those subdivisions, and then what elements

may be taught. This is the kind of analysis that was attempted in this country at the beginning of manual training work more than thirty years ago. As a result of such an analysis it was stated that what was needed in industry was accuracy, carefulness, neatness, perseverance, inventiveness, and a longer list of other qualities. Then it was observed that all successful men need these qualities; consequently whatever would train these qualities in individuals should become a part of general education. Manual training had seemed to do this, hence manual training should become a part of general as well as technical education.

We know that this analysis and this inference were in harmony with the psychology of that day. We know also that since that time psychology has turned a somersault, but it now stands just far enough in advance of its position at that time to make the analysis of that day seem out-of-date and inadequate. The time has apparently come when a new analytical study is needed, and this time we may believe that it will be more specific; it will be of industries instead of industry. Just as we now deal more definitely with individual children in their instructon so we need to consider more definitely the essential elements in individual industries. Something approaching this kind of analytical work has already been begun in at least one industry. If such work should reveal what may be regarded as the essential elements in vocational training, and if some of these elements are common to many industries, as may be expected, then these more or less common elements may be considered appropriate material for manual training or prevocational or elementary industrial courses, provided, of course, that they relate to handwork instruction. Some of these common elements are quite sure to relate more closely to hygiene, to moral teaching, to civics, and to economics, than to manual training, but we know that some handwork processes are common to a large number of industries, and it is more than probable that these are not all and not adequately covered in the best of our present manual training courses.

So, then, we may confidently look for new elements and important ones to come into what may still be called manual training, but until we see more clearly what these will be, we cannot understand how they will need to crowd out the elements that were of greatest value in the earlier manual training work, such as methodical doing, analysis of process, selection of fundamental processes, the best technic, study of construction, and the making and use of working drawings. On the contrary, if there should still remain (and we do not doubt it) a division

of school work, general in character, preliminary to specific vocational training, such as is now more or less definitely designated as manual training, then we may confidently expect that its elements will be determined thru the same process of analysis and selection and pedagogic arrangement as were the elements of instruction in the early days of manual training. We may confidently believe that the method of organizing the elements will be fundamentally the same as it has been in the past, tho the elements may be different and the result different.

If, as now seems sure, the vocational demand upon manual training will bring with it more time for manual training work, then its educational value will be increased. There is no need to fear the loss of early educational values thru the coming of the vocational demand.

II. THE APPLIED ART DEMAND.

At the present moment there seems to be more danger of losing some of the earlier educational values of manual training thru the applied art demand than thru the vocational demand. This is not due to any necessary elements in the situation but entirely to factors which ought to be removed, such as over-enthusiasm for art expression which leads (a) to forgetfulness of construction and technic, and (b) to the selection of crafts that have little social value and involve almost no construction. It would seem that this proposition needs no discussion before this audience. To diagnose the case is to suggest the cure—the proper training for teachers. It would seem that the discussions of the past few years by artists and teachers alike ought to have made it clear that the very end and aim of applied art in school work is doomed if the worker does not know the structural basis of his craft and possess at least a reasonable mastery of the tools of the process. Yet it is not uncommon to see a teacher with a one-sided preparation "fiddling away" at tools or, on the other hand, a good workman enamored with the making of fussy knicknacks and decorating them with curves and colors he ought to let alone.

The remedy for this is not in refusing to meet the applied art demand, but in giving adequate preparation to all the teachers who attempt to teach applied art. Until properly trained teachers can be obtained, some restraining supervisory force may need to be exercised if the earlier values of manual training are to be preserved. But as we look toward the east we see the signs of the dawning day when the

applied art demand as well as the vocational demand shall add to and in no way detract from the original values of manual training in the schools.

III. THE CLAIMS OF THE FACTORY METHOD OF INSTRUCTION.

If the routine and method of the productive factory were likely to gain much headway in prevocational and manual training work, then the factory method might be regarded as the most dangerous source of pressure upon manual training, so far as the earlier educational values are concerned. It seems to have been demonstrated that in the advanced stages of vocational training, after a good grounding in manual training work, experience in a producing factory is highly educative, provided a reasonable variety of work is done. This has been proven in manufacturing establishments and in producing factories in schools. It seems also to have been demonstrated that in the earliest stages of shop instruction, whether that instruction be with strict vocational end in view or merely with a prevocational or a manual training end as the goal, experience in a producing factory is not as educative as experience under proper instruction in a school shop. To prove this it would seem necessary only to cite cases where factories have provided apprentice schools with special rooms for the beginners to learn the elements of handwork thru graded courses of lessons designed to give apprentices the fundamentals in the best way. This way the factories have found to be the cheapest in the long run. Some figures gathered by Mark B. Hughes, of Detroit, for a report to the National Association of Corporation Schools are significant. To the question, "Do you believe manufacturers would be sufficiently benefitted to warrant the expense of establishing apprenticeship or corporation schools?" 38 of the large corporations in the country, including 11 of the largest railroads and many great factories such as the General Electric Co., The Westinghouse Electric and Manufacturing Co., The Western Electric Co., Browne and Sharpe Manufacturing Co., and R. R. Donnelly & Sons Co. answered "Yes." There was not a single "No" vote and only one voted with a question mark. To the question, "Do you favor a special mechanical instructor or allowing the shop foreman to do all the instructing? 30 answered in favor of the special instructor, 5 the shop foreman, and 2 both. Anyone who has visited such a school as the one at the Lakeside Press in Chicago must be impressed with the fact

that both the boy and the factory are profiting by separating the apprentices from the journeyman during the early stages of their apprenticeship and giving them work which is for the most part unproductive, except educationally. Moreover, as far as I have been able to discover, all the older trade schools accept this general principle in the treatment of beginners.

Yet in spite of such proofs, and the experiences of many other teachers, which need not here be mentioned, we still read in the popular press that the way for a school to be practical is to have a boy learn cabinet-making, "because the school needs desks," plumbing because a new school needs pipes, boiler-firing "because the school dyanmos have to be kept running," and printing, "because somebody has sent in a job, and will pay for it when it is done." This is considered the new type of manual training. The claim for it is that it is "real" and "serious," and by way of contrast the statement follows that the ordinary manual training "is not serious, not related to actual life."

If this kind of program were to be carried out in the advanced or vocational work there would be no occasion for mentioning it in this connection, but as it takes the place of manual training in grammar and lower high school grades it is appropriate to point out possible defects:

First, things made in a manual training shop do not have to be sold at so much per hundred or dozen or piece in order to be serious business for boys. In fact some believe quite the contrary. It is far more serious business from the boy's standpoint when he is going to have and use the thing he is making than when he is spending all that energy in order that somebody else may enjoy the thing he makes. All our experience, our psychology, and our common sense confirm this if we have in mind the boys of manual training age before they have begun to feel the pressure for earning money or have fixed their ideas quite definitely concerning a vocation.

Second, this factory production method of teaching would tend to take manual training out of the realms of pedagogy and put in into that of the commercial shop. It would ignore the good and see only the bad that has been developed in educational handwork during the past twenty years. If this were to be generally adopted it would in large measure deprive manual training work of the educational values stated at the beginning of this discussion.

Conclusion. In order to retain the earlier educational values of manual training we do not need to turn back any wheels of real pro-

gress. We may heartily welcome the vocational demand, and the applied art demand and, in their proper place, the suggestions that come from the methods of the producing factory. On the other hand, we should not be turned aside by each new thing that appears. It is to be expected that there will be some chaff to be blown from each year's crop of grain.

THE BOY WHO WOULD BE INSURED SUCCESS IN HIS COMING VOCATION MUST BE REQUIRED TO BUCKLE DOWN TO SOLID WORK OF A KIND AND AMOUNT TO SUIT HIS YEARS AND STRENGTH. HE MUST LEARN THROUGH CHARACTER-BUILDING EXPERIENCE OF TOIL, NOT ONLY WHAT IT MEANS TO STAY BY AN ASSIGNED DUTY TILL IT IS PERFORMED, BUT HE MUST ALSO EXPERIENCE THE UNFAILING JOY OF WORK WELL DONE. HE WILL THUS HAVE THE ADVANTAGE OF THE SPUR OF SUCCESSFUL EFFORT AND ACQUIRE THE BEGINNINGS OF THAT SPLENDID SELF-RELIANCE WHICH IS A DISTINGUISHING MARK OF ALL SUCCESSFUL MEN. —W. A. McKeever.

INTRODUCTORY PROBLEMS IN ARCHITECTURAL DRAWING.

George E. Chandler.

THE value of problems involving geometric construction as a training in the skillful handling of the instruments has long been recognized. The monotony and lack of practical application of such problems, however, as they are usually given, has prevented the extended use which they really deserve. The following problems have been selected, analyzed, and arranged to utilize geometric construction in as simple a manner as possible. Presented in this way they not only give the student actual problems which he can see and understand, but help to acquaint him with details which he will need in his more advanced work in architectural drawing. The problems represent some important details of building construction. For the most part they are sections of molding or parts of interior finish and can be found in any standard millwork catalog. The exact size and shape of each molding is given, and the method of drawing it is indicated. The small perspective sketch in the upper right hand corner will help the student to see how the object really appears. The number above the figure, e. g. 8394, 8286, 8309, refers to the manufacturer's standard list, and is given merely as a matter of reference for the work to follow later in the course. Notice that the complete solution of each problem is not given and that merely enough is shown to enable the student to work it out for himself. The light lines on the figures indicate construction lines.

Altho these problems furnish an excellent drill in accuracy for the student in any part of the course in drawing, they were designed primarily to teach the beginning use of the instruments. The first few problems are therefore simple in character, and increase in difficulty as the student acquires facility in handling the instruments.

The student should cultivate the habit of working to "cross lines" in penciling-in each figure. Plan to place the figure centrally in the space allowed for it—usually one-fourth or one-half of the sheet. In beginning a problem block in first the overall dimensions given directly above the figure and having done this the rest of the problem may be easily solved.

Where no definite order of laying off the drawing has been given, the following steps may be used to advantage.

A. Penciling.

1. Place paper on board. (Right side up).
2. Placing scale on the paper horizontally, make vertical measurements for border and cutting lines.
3. Placing scale on the paper vertically, make horizontal measurements for border and cutting lines.
4. Pencil lightly the border and cutting lines working to "cross lines."
5. Put name in lower right hand corner, $\frac{1}{8}''$ below the border line, making the letters $\frac{3}{16}''$ high. (The position and size of the name may be changed if desirable.)
6. Figure out the placing and spacing of the object.
7. Make vertical measurements for the object.
8. Make horizontal measurements for the object.
9. Pencil in object lightly, working to "cross lines."
10. Pencil in object with full lines.
11. Pencil in border lines with full lines.

B. Inking.

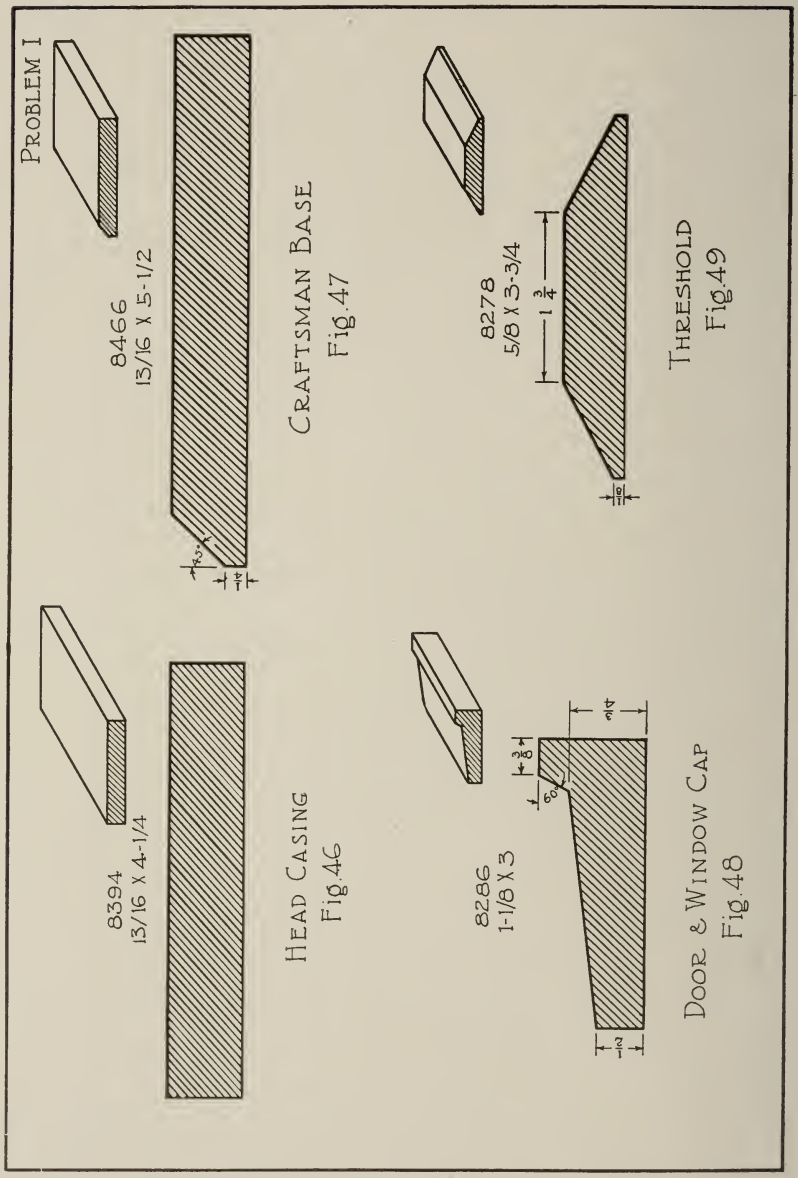
1. Never ink a drawing until it has been approved by the instructor.
2. Never use a ruling pen without a straight edge.
3. Hold ruling pen perpendicular to the paper and inclined slightly in the direction in which the line is being drawn.
4. Order of inking lines:
   a. Circles and arcs.
   b. Horizontal lines from top to bottom.
   c. Vertical lines from left to right.
   d. All slant lines.

Figure 45 shows the manner in which the sheet should be laid out and appear when completed. The light lines indicate merely the manner of placing and penciling in the figures. Draw to a scale $12''=1'0''$. Solve completely and leave in all construction lines in pencil. The dimensions, lettering, and cross-hatching may be omitted.

Problem I deals merely with the intersection of straight lines.

Problem II embodies simple acrs of circles, locating the centers, Fig. 50*b*, and drawing lines tangent to them. Pencil in all lines of tangency, Fig. 51.

Problem III shows the application of the elements given in Problems I and II in the form of an assembly drawing. Note that the student is referred to the preceding Problem, Fig. 50*c*, for the construction of the cove molding No. 8060. Note also the method of breaking away a portion of the material at *d* to economize space.


PROBLEM I
8466
13/16 X 5-1/2
CRAFTSMAN BASE
Fig. 47
8394
13/16 X 4-1/4
HEAD CASING
Fig. 46
8278
5/8 X 3-3/4
1 3/4
THRESHOLD
Fig. 49
8286
1-1/8 X 3
3/8
DOOR & WINDOW CAP
Fig. 48

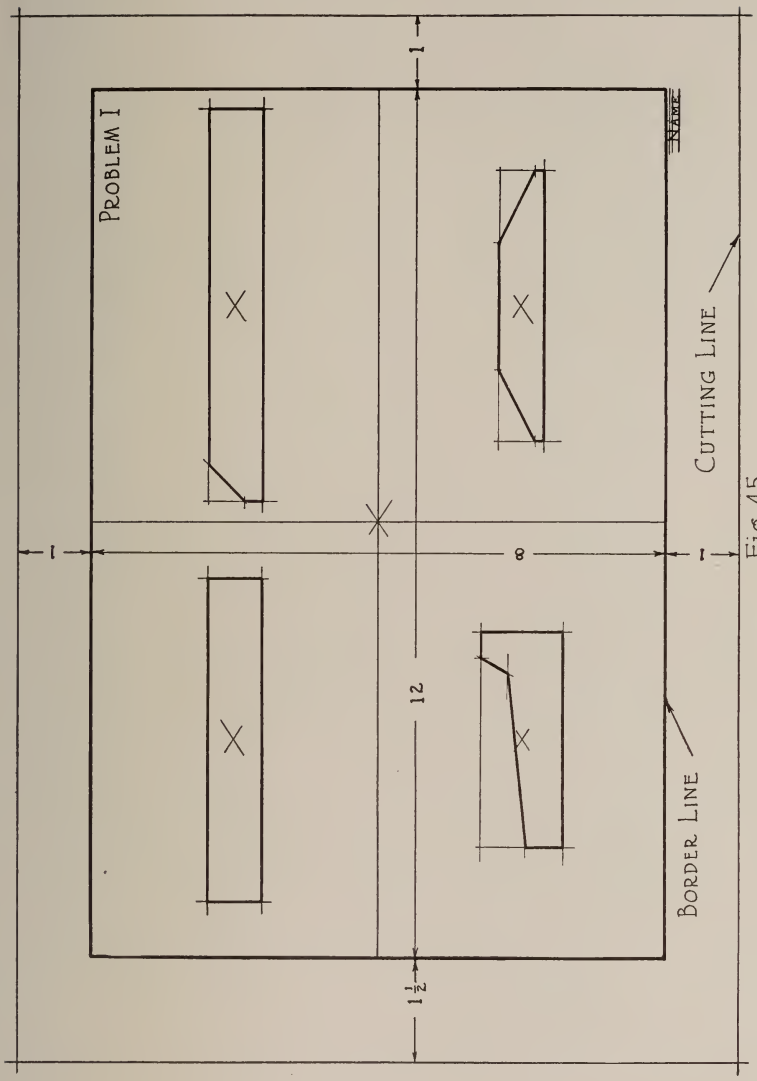
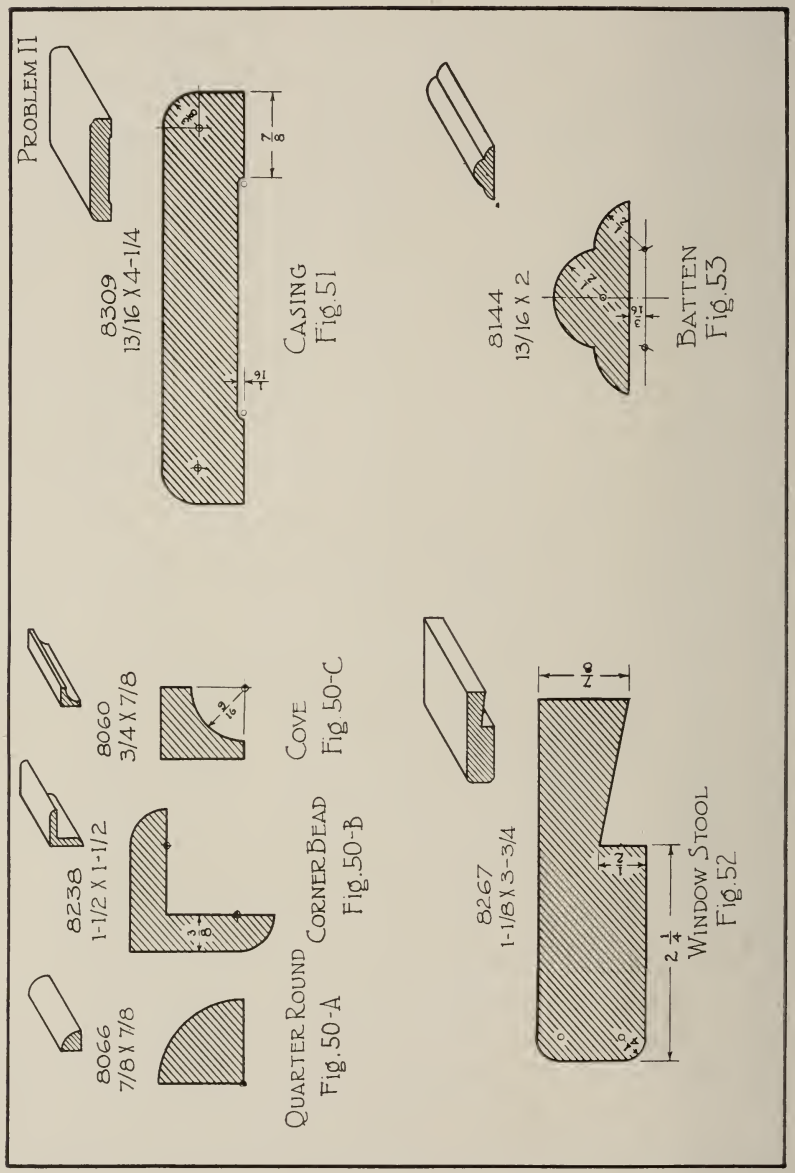
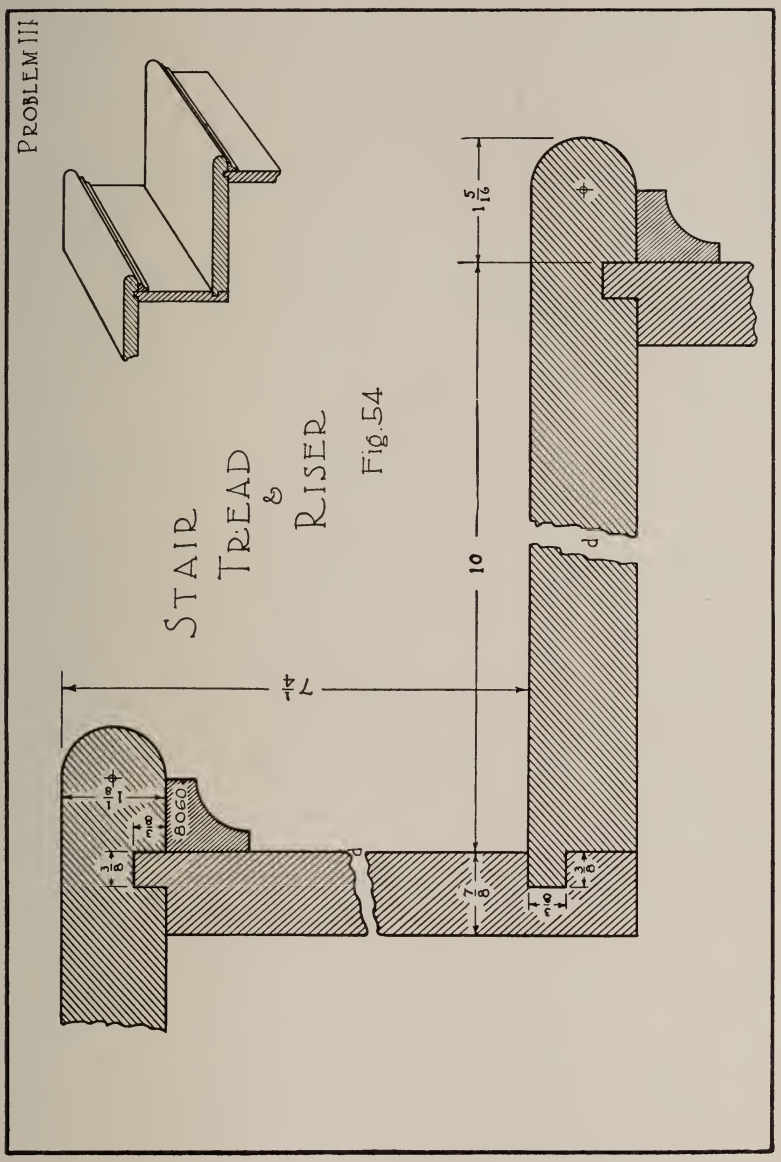


Fig. 45


PROBLEM 11
8309
13/16 X 4-1/4
CASING
Fig. 51
8144
13/16 X 2
BATTEN
Fig. 53
8238
1-1/2 X 1-1/2
8060
3/4 X 7/8
8066
7/8 X 7/8
QUARTER ROUND
Fig. 50-A
CORNER BEAD
Fig. 50-B
COVE
Fig. 50-C
8267
1-1/8 X 3-3/4
2 1/4
WINDOW STOOL
Fig. 52


PROBLEM III
STAIR
TREAD
&
RISER
Fig. 54
7 1/4
10
1 5/16
7/8
1 1/8
3/16
1/8
1/16
1/16
1/16

PRINCIPLES OF DESIGN APPLIED TO MILLINERY.

LYDIA BOLMAR AND KATHLEEN MCNUTT.

IN no department of dress are the rules and principles of good color and lines so often violated as in millinery. We seem to forget that a hat, to be a hat must, first of all, fulfill the very reason for its existence; that of being a covering and protection for the head. When a hat has fulfilled this requirement of use it has also fulfilled one of the demands of decoration. For decoration which does not

FIG. 1.

conform to use has retrograded into mere ornamentation. Now, when the requirement of use is fulfilled in a pleasing and artistic way, the lines of the hat must conform to the lines of the head and face, repeating and strengthening good lines, avoiding or modifying bad ones.

In constructing the hat crowns shown in Fig. 1, a and b, the shape and size of the head have been entirely disregarded. In c a true relationship has been established.

A hat should not be hung on a corner of the head, Fig. 1, a and b, but placed so as to become, apparently, a part of the head.

Good space relation should exist between width of brim and height of crown, Fig. 2, a, b, and c.

Two curves of equal length, Fig. 2, d, are not as pleasing as one long and one short curve, Fig. 2, e, for equal curves, like equal areas, are monotonous.

Two, or at most three, are as many dents or curves as may be used with good effect in the brim of a hat, Fig. 2, f.

Equal divisions should be avoided, Fig. 2, g and h.

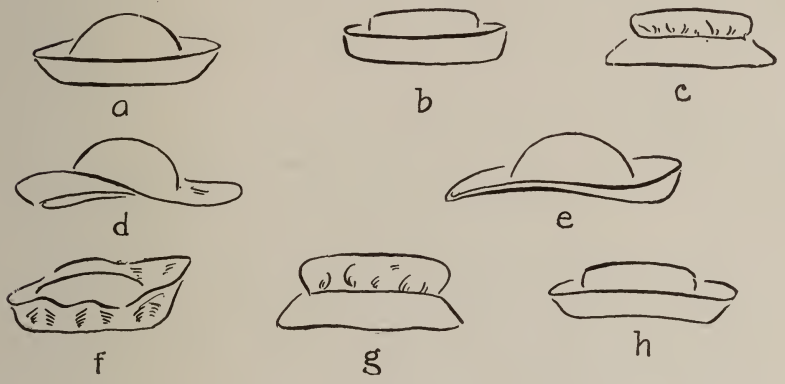


FIG. 2.

RELATION OF TRIMMING TO STRUCTURE OF HAT.

The portion of a hat crown covered with trimming should bear a pleasing relation to the space left uncovered, Fig. 3, a and b. A little contrast is often desirable to avoid monotony, Fig. 3, c.

In general, the lines in the trimming should conform to the structural lines of the hat, Fig. 3, d.

Lines in trimming entirely out of harmony with the lines of the hat are shown in Fig. 3, e.

Many points of equal or nearly equal interest are not desirable except in wreath form, when points of interest are equally spaced, Fig. 3, f.

Similarity of line accentuates both good and bad lines, Fig. 3, g, h, and i, so that we should avoid repeating any but the good lines of the face, in the lines of the hat. As a person advances in age and

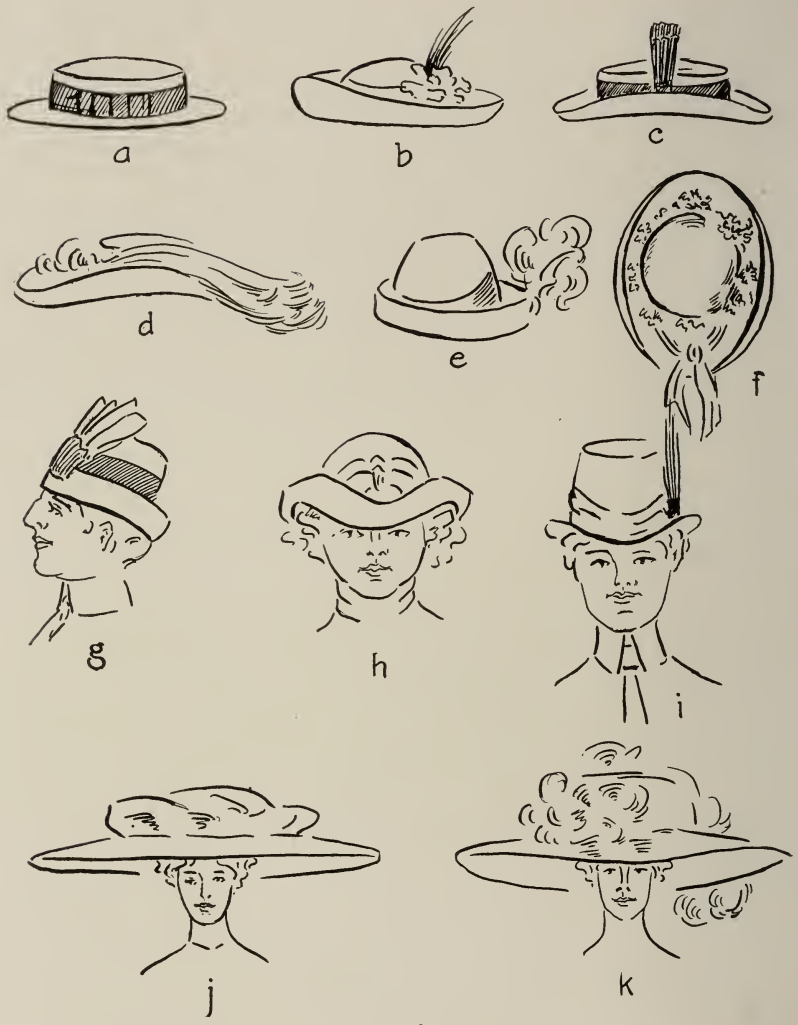


FIG. 3.

the full round curves of the face are straightened and hardened, the lines of the hat should become less severe, taking on a soft curved tendency, thus tending to neutralize the general effect. Too much contrast is as bad as too much similarity, Fig. 3. j and k.

A SCHOOL GAS ENGINE.

F. F. Hillix.

IN these days of automobiles, motor cycles, motor boats, and general purpose gas engines, the construction of a gas engine is a live subject. Upon opening a trade journal it is a common thing to find an article entitled, "A few points upon the foundry practice," by Blank & Company. This article will be illustrated with pictures of molding machines, and floors showing hundreds of molds, which will make engine castings when poured.

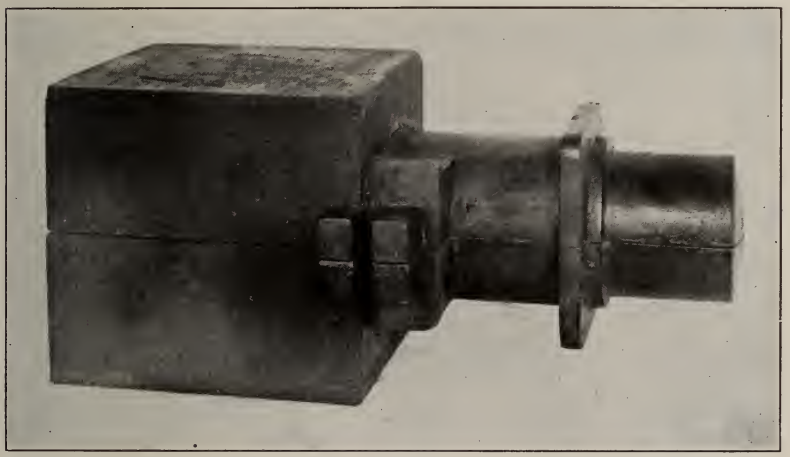


FIG. 1.

In the school foundry, one does not generally find the molding machine, but will find a class of boys who are anxious to try to make a gas engine. To meet this demand we got out the patterns for an engine. This engine is made at the end of a 12 week's course, 8 hours per week, of foundry work.

The engine shown is of the two cycle type, 2½″ bore, 3″ stroke, air cooled. The two cycle engine is a simple engine for the machine classes to build, and also the air cooled engine is more simple to cast in the foundry.

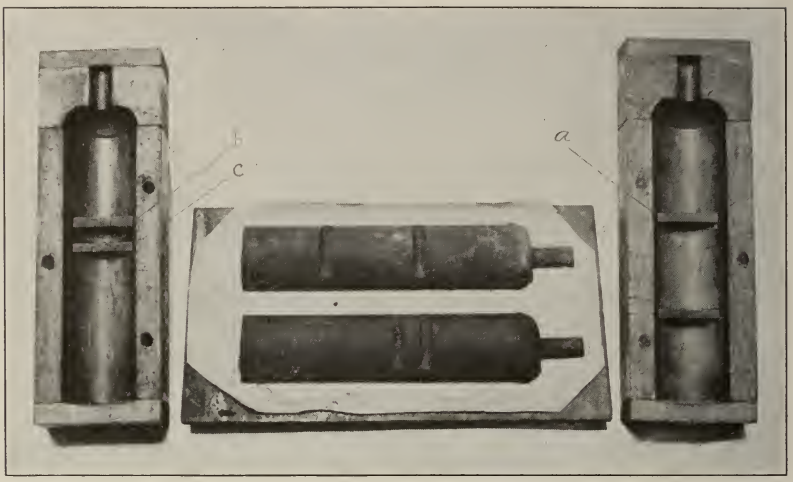


FIG. 2.

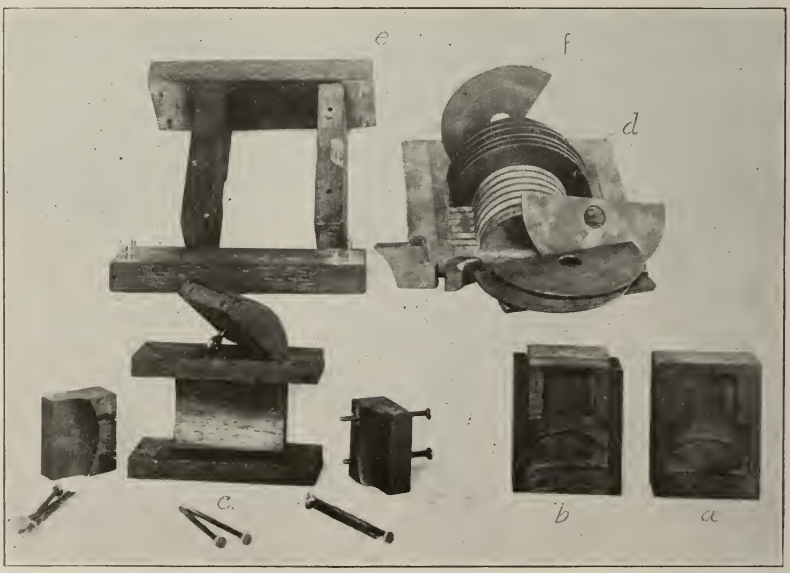


FIG. 3.

The pattern is shown in Fig. 1. The right-hand end, showing the print for the inside core and the bottom flange, is cast in green sand. The left end, showing the large square core print, is the top end of the cylinder. The air cool flanges are cast in a core using the square print shown. It is our intention to use the same pattern and by the use of an extra core make water cooled engines. This will be a convenience to the foundry instructor because all the port cores and the core for the bore will then be standard.

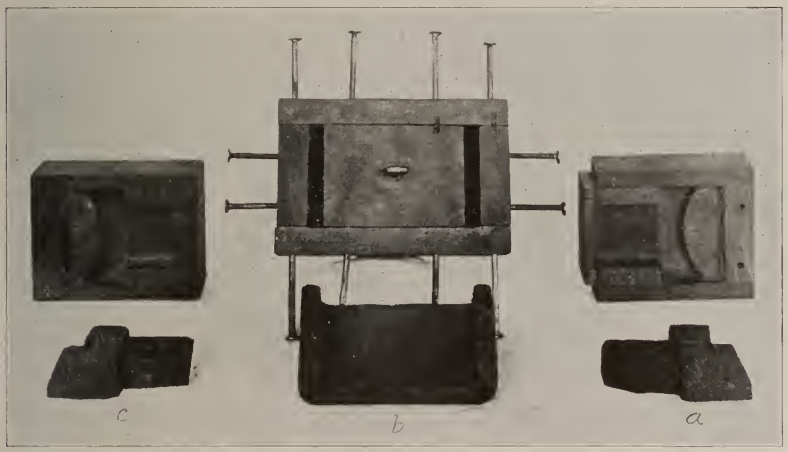


FIG. 4.

Fig. 2 shows the core boxes and the two halves of the core for the bore. The small rectangular projections in the boxes, at *a, b, c,* are prints for the port cores. The bypass core fits into the two prints at *a,* the exhaust port into *b,* and the inlet port into *c.* Before pasting the halves together, a vent is scratched in each half of the core leading from end to end. A small hole is bored from each port core print into this vent.

In Fig. 3 are shown the component parts of the core boxes to produce the exhaust core, *a,* the inlet core, *b,* the bypass core, *c,* and the cores for the air cool flanges *d, e, f.*

Fig. 4 shows the exhaust port core and box at *a,* the bypass core and box assembled at *b,* the inlet core and box at *c.*

The box for the air cool flanges is shown in Fig. 5, and consists of the following principal parts: the casting, *a,* frame *b,* and slides, *c.*

The casting, *a,* is the shape that is desired for the outside of the upper part of the cylinder exclusive of the air cool flanges. This must be carefully finished so that both sides are symmetrical, because both cores are to be made from it. The slots for the semicircular metal pieces, *c,* are then carefully spaced and cut thru. These slots must be absolutely square with the center line of the cylinder or the flanges will not meet at the parting line of the pattern. These flanges are $\frac{1}{16}''$ thick and $\frac{3}{4}''$ wide. The error necessary to make a very rough casting is exceedingly

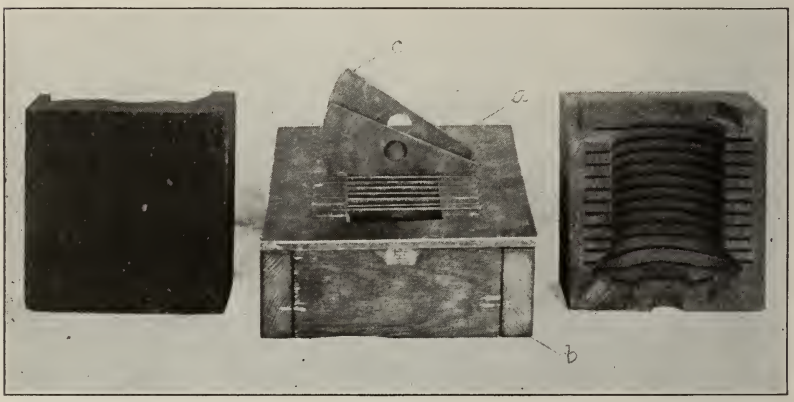


FIG. 5.

small. The frame *b* is to make the square part of the core. Here again the work must be exact, because all errors are doubled when the two halves of the core are assembled. Allowance must be made for the rap of the pattern and the box, because the core must just fit in the mold.

The box is turned over from the way it is shown in Fig. 5, and is used as follows: A small clamp is put on to hold the frame together and the slides are pushed down so that they are flush with the surface of the bottom. The box is then filled with core sand, rammed in the usual way, and the core struck off flush with the top of the box. A plate is put on, the box turned over, and rapped slightly. The slides are drawn, as shown in Fig. 5, the casting, *a,* acting as a stripping plate for them. This makes the flanges. The casting, *a,* is lifted off. The frame, *b,* is made of four pieces and is carefully removed, a piece at a time. The core is ready for the oven.

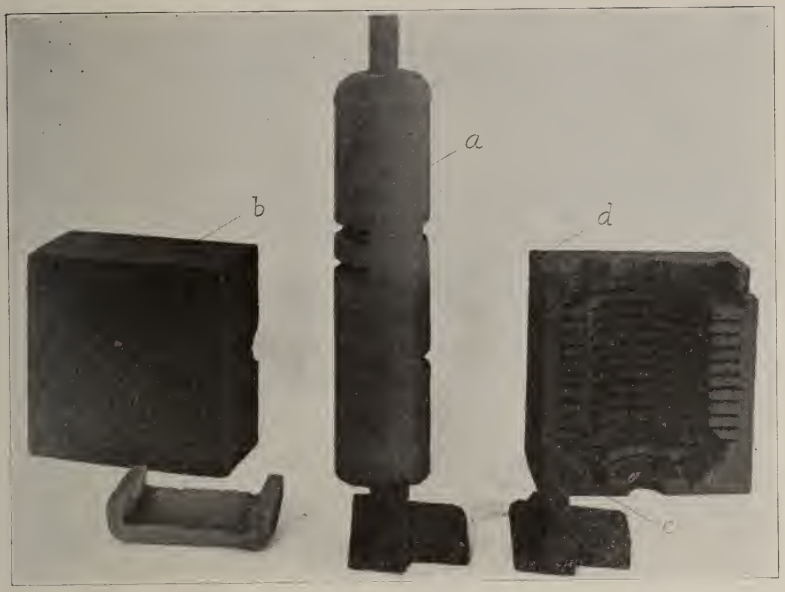


FIG. 6.

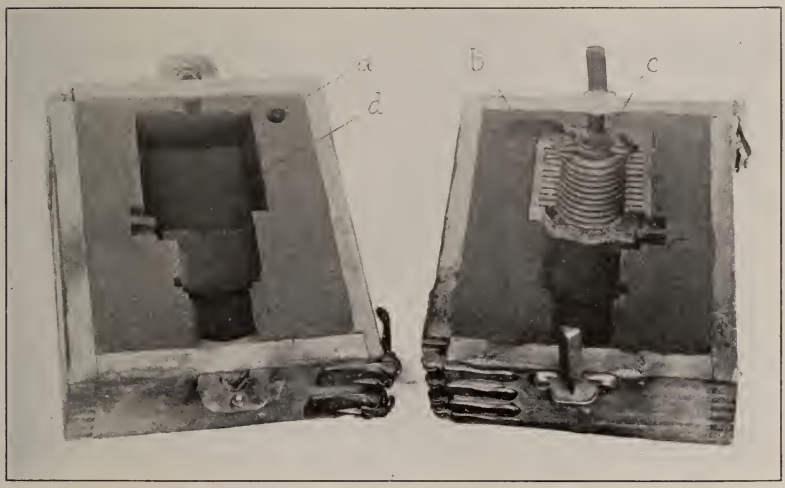


FIG. 7.

Fig. 6 shows the complete set of cores, the core for the bore, *a*, having been pasted together. The pouring gate is filled in the corner of the core, *b*, as shown at *c*.

Fig. 7 shows the mold made in a snap flask with the sprue pin hole at *a*, runner at *b*, and the core in place at *c*. The other flange core at *d* has not been put in.

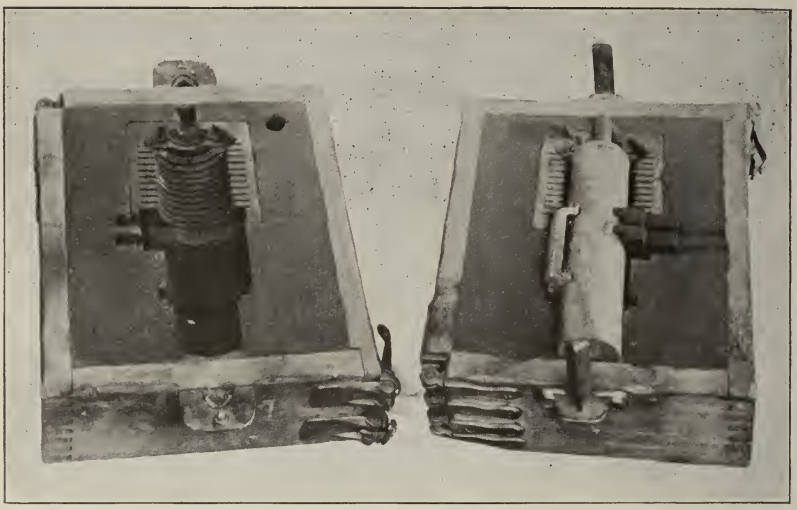


FIG. 8.

Fig. 8 shows the mold with the cores in place and ready to close. It is important to see that all the loose sand is blown out of the gate and mold before closing. It is well to measure the cores and see if they have been pushed down properly, to avoid cutting thru the casting on the cope side.

Fig. 9 shows the casting at *a* as it comes from the sand. The risers, *c*, are made by pushing a large vent wire, ¼″ in this case, thru the cope before closing the mold. We found that if a large riser was used it drew from the casting and caused a hole at the place where it joined the casting. The casting averages ⅛″ in thickness, so a riser is hardly necessary.

The gate pin is 1¼″ in diameter and the iron must be put in as fast as it will run down this hole. This is the reason for the large basin at the top. At *b*, Fig. 9, is shown one of the castings for a small sewing-machine motor. This casting is about 7 inches in diameter and ⅛ inch in thickness.

Fig. 10 shows a group of cylinder castings, also one that has been sawed into sections.

For work of this character, the cores must vent freely and be true to shape. For the cores we use a sharp sand, that is reasonably coarse, and for a binder, resin 1 to 24, and linseed oil 1 to 48. These cores do not require any blacking and are easy to remove from the casting. Glutrin works all right if the mold does not stand over night with the cores in. The resin cores seem to work a little better, however.

FIG. 9.

The getting of the proper iron is no small part of the making of cylinders, so I will describe briefly the method used in handling the cupola, following very closely the method described by Dr. Moldenke, page 421, Transactions of the American Foundrymen's Association, Vol. XXI.

I must say in recommendation of Dr. Moldenke's method that in my experience I have never found anything that so nearly fits the case. I thought that I had made some pretty good castings before, but was greatly surprised at the improvement in grade of the iron produced after changing my method of charging the cupola.

The first rule is that the bed charge of coke must be of the proper height to bring down iron in 8 minutes after putting on the blast. If iron comes down before the blast has been on 8 minutes, the bed charge is too low. If more than 8 minutes, the bed was too high. The cure in either case is obvious.

The bed must be burned thru and to a nice red heat before charging the first iron. In charging, mix all the iron and coke in proper

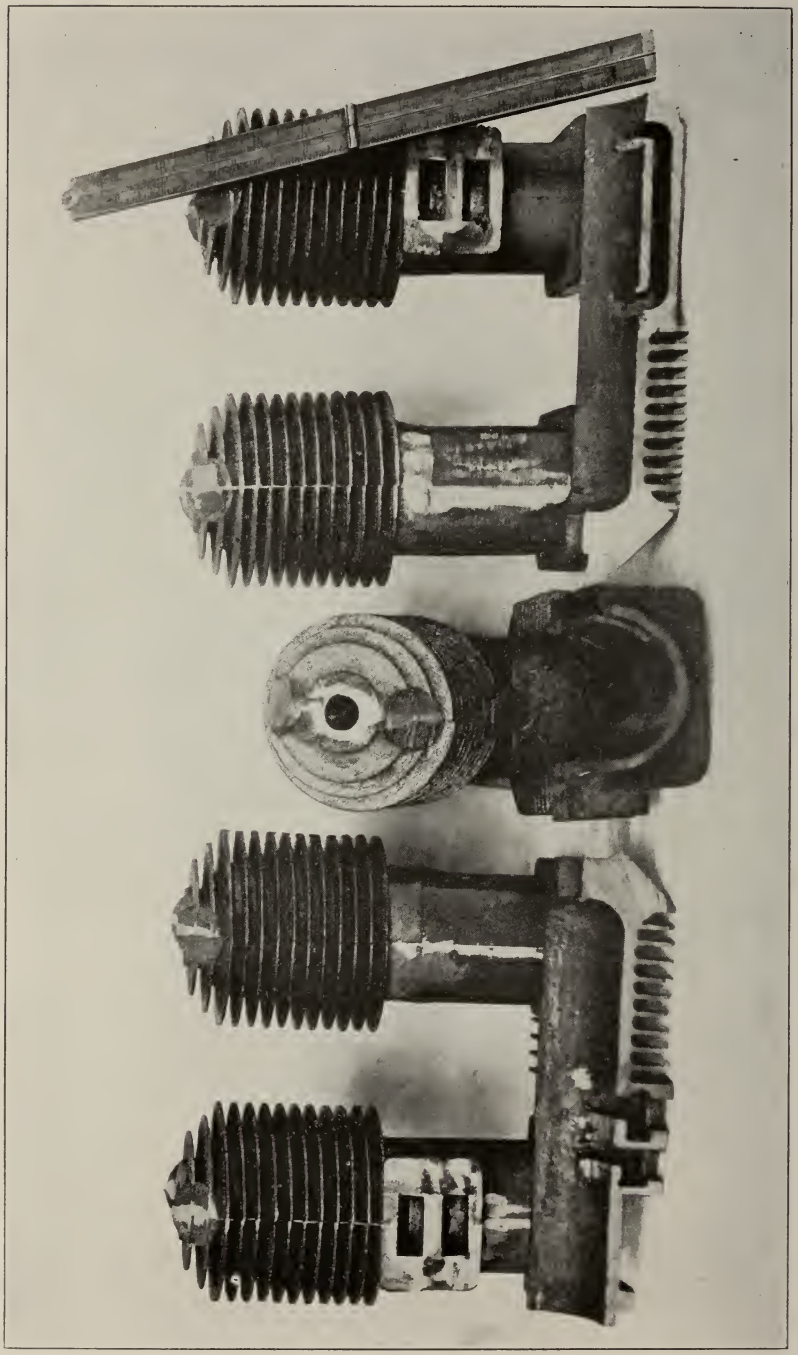


FIG. 10.

ratio before shoveling into the cupola. This seems to be the really new part of the method. Dr. Moldenke discusses the reasons for this at some length in his article.

Break all pig iron up fine. For a small cupola, 18″ for instance, break each pig into 3 or 4 pieces. This is important if you want hot iron. An easy way to break pig iron is to drill holes thru the pigs and then drive in a tapered steel plug.

Break up the scrap into small pieces so that two or three pieces can not wedge across the cupola and bridge.

To cast the cylinders shown we used 75 per cent A. A. Scotch pig, and 25 per cent machinery scrap. They are all that could be desired in softness and clean iron.

The charging sheet was as follows:

Melting Ratio—1 coke, 8 iron.

Five hundred pounds machinery scrap spread in windrow on charging floor, 62 lbs. coke spread evenly over the top of the iron.

Four hundred pounds Scotch pig and 100 lbs. machinery scrap spread in windrow beside first charge, 62 lbs. coke spread over top as before. Additional iron and coke is brought up and mixed as needed.

When all was in readiness, the bed burned thru, the charging was begun. The man was careful to shovel up the floor clean as he went. As soon as the cupola was full to the charging door the blast was put on. The charging was continued as needed to keep the cupola full. When charging the pig iron, care was taken to have the pigs fall in the center of the cupola to avoid oxidation of the iron.

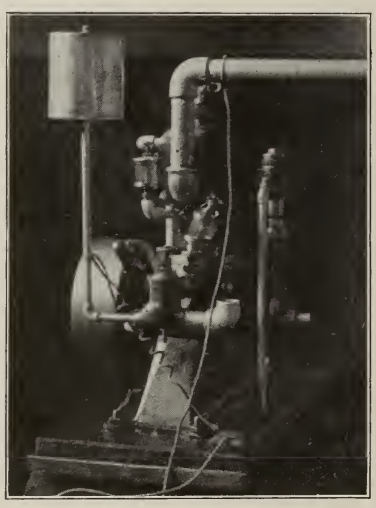
The 500 lbs. of scrap iron was charged first, and was held until by timing we were sure that the 500 lbs. was melted. This was tapped out, and the iron and slag allowed to run until the cupola was drained out clean. This iron while it flowed white hot was chilled somewhat by the ladles, so it was not fit for the thin work. It was used for castings more than ¼″ in thickness.

As soon as the ladle was empty it was scraped out and made ready to receive the pig iron. This was tapped out when the proper time had elapsed to melt about 450 lbs. This was done to avoid getting any scrap from the following charges. At the first sign of slag, the bod was put in. This iron was used for engines, motors, and all small thin castings that were likely to chill if made of scrap iron. As the ladles were hot, this iron was very fluid. To test it we use a wedge

¼″x1″x12″ long tapered out to a shaving at the thin end. The iron will often run to the end of the wedge and half way thru the cope in a ⅛″ vent hole.

Do not let any slag run out on top of the iron when tapping the pig iron. Also skim the iron carefully when pouring the iron from the bull ladle to the small ladle. We use a wide skimmer so that the iron is really taken an inch or more below the surface of the iron in the bull ladle. If the iron is treated in this way, no trouble from dirty iron should occur. Iron melted as above will show clean and sound after machining the cope side of a casting.

In pouring the cylinder, dump the iron as fast as it will run in; try to keep the pouring basin full. It is important to avoid slopping any iron into the gate, trying to find the hole. This slopping causes shot iron and defective castings.



A 2-H.P. WATER COOLED, TWO CYCLE GASOLINE ENGINE MADE AFTER VIGNEAU'S DESIGN AT BOYS'. HIGH SCHOOL, FREDERICK, MD., SPENCER C. STULL, DIRECTOR OF MANUAL TRAINING.

NOTES ON THE STUDY OF WOOD IN THE SHOP.

Charles F. Smith.

THE presence of wood for past ages in the daily lives and necessities of the human race has detracted from a general realization of its extreme importance. Early settlers had apparently inexhaustible forests to supply their needs and consequently gave little thought to forestry, but the growing scarcity of available timber trees today makes the study of conservation and the utilization of wood essential to the future welfare of our country. Since the wood-using industries of the United States employ more men than any other group of industries the study of that material in our schools seems justifiable from the standpoint of practical utility, and in institutions emphasizing industrial education there should be no question concerning the importance of this subject.

PRACTICAL VALUE OF THE STUDY OF WOOD.

Much of the literature on wood, even that appearing in trade journals, is more or less technical and therefore not fully appreciated by the average reader because of his lack of knowledge regarding the elementary characteristics and properties of wood. The woodworking shop seems to be the appropriate place in which to study wood, for, inasmuch as it is extremely variable and very complicated in structure an understanding of its properties can best be acquired by careful study correlated with shopwork. Where time permits it would be valuable to add to the study of the raw material itself that of growing trees, leaves, enemies of the forest, logging, milling, transportation, sources of supply, etc. The value of the study of wood structure is summarized in Bulletin 10, "Timber" as follows: "A knowledge of structure not only enables us to distinguish the different woods, judge as to their qualities, and explain the causes of their beauty, but it also becomes an invaluable aid to the thoughtful worker, guiding him to a more careful selection and a more perfect use of his material."

THE PROPERTIES OF WOOD.

The properties of wood may be classified under the following heads: biological, chemical, structural, mechanical, and physical. It is assumed

that manual training teachers have a fundamental knowledge of wood, therefore only those properties which affect the handling of the wood in the shop are discussed in a brief general way in the sense in which they are to be used. Since wood is considered here chiefly in the form of lumber, the structural, mechanical, and physical properties are of greater importance. The biological properties might also be termed botanical for they refer to the form, size, reproduction, abundance, and range of trees. These factors are of most importance in determining the commercial use of timber trees. The chemical properties determine largely the color, durability, and value of wood for fuel, pulp, distillation, etc.

STRUCTURAL PROPERTIES.

The structural elements of wood are of great importance in determining its internal and external appearance.

Sapwood and Heartwood. Most mature trees contain two distinct portions: the lifeless interior heartwood or duramen, and the outer sapwood or alburnum, including the growing cambium next to the bark. Sapwood, compared to heartwood, is usually thinner, lighter colored, less durable, and less valuable. The fact that just the opposite of the above is true of some trees illustrates the variableness of wood. For example, red gum trees occasionally contain all sapwood; red oak sapwood is darker, sycamore heartwood is less durable than sapwood; red gum sapwood produces beautiful figured wood used to imitate Circassian walnut; and hickory sapwood is more valuable for handles than heartwood.

Annual Rings. The formation of annual rings by the difference in growth and appearance of spring and summer wood is generally known. In some species the rings are very indistinct but they are absent only in tropical trees.

Medullary Rays. The medullary or pith rays found in all wood greatly influence its appearance. The beauty of such woods as oak, sycamore, and beech, in which the rays are distinct, is enhanced by quarter-sawing, which exposes the broad faces of the rays.

Grain and Texture. The word "grain" is used indiscriminately among woodworkers, and may refer to rings, rays, figure of grain, texture, or even to hardness. There seems to be no generally accepted definition of the term. Grain is used here only in designating the direction of fibers. Thus wood is either straight, crooked, cross, curly,

wavy, or spiral grained. The word "figure" is use in describing the pattern of the grain due to peculiarities of growth. The word "texture" seems more appropriate than "grain" when referring to structural composition resulting from the form, size, and arrangement of pores and fibers. Thus wood is coarse or fine textured if its pores and fibers are relatively large or small, and even or uneven textured depending upon the distribution of its component elements.

Structure explains the monotonous tone of basswood; the obstrusiveness of hard pine, with its distinctly marked spring and summer wood; the beauty of quartered oak with its silvery spots on a brown wavy background; and the rich beauty of the blended light and dark spots and sreaks of "figured" mahogany. Under structure such minute elements as trachaeids, cells, wood fibers, and parenchyma might be studied in detail in advanced work.

MECHANICAL PROPERTIES.

The mechanical properties of wood are most important to the manufacturer, for combinations of these qualities determine the suitability of wood for particular purposes. A thoro study of these properties is rarely undertaken in other than forestry schools, for it involves advanced mathematics, formulae, and numerous technical terms. It seems that the manual training student has sufficient knowledge if he knows whether or not a certain species is strong, stiff, elastic, tough, hard, and its degree of cleavability; all of which can be illustrated and explained even in the grade workshop. Actual figures are of value chiefly for comparison; those given are usually based on Sargent's investigations, "The Jessup Collection."

PHYSICAL PROPERTIES.

Of the physical properties of wood, its behavior before and particularly after seasoning is of most importance to the manual training teacher and student. Shrinking, swelling, warping, and checking are even more problematic to the teacher than to the manufacturer. The furniture manufacturer, for example, converts kiln-dried stock into furniture very rapidly, while the shop teacher can seldom obtain thoroly dry lumber, and then he requires much more time to make similar pieces.

There is excellent opportunity when studying physical properties in

high school to introduce experimental work. For cabinet work it is necessary to know the dryness of lumber, so the following method for testing dryness suggested by the editor of "The Hardwood Record" is given. At a point two or more feet from the end of a board 12″ wide cut a section $\frac{1}{8}$″ long; allow this to dry about twenty minutes on a hot plate or radiator; and if after lying in the shop for a day, this section has shrunk no more than $\frac{1}{8}$″ in width it may be considered commercially dry; i. e., it contains anywhere from six to nine per cent of moisture.

When the dry weight [1] of a particular species is known it is a simple problem to determine its specific gravity and moisture content. Radial, tangential, and longitudinal shrinkage may be determined by cutting from green wood an exact cube with two of its faces cross, two radial, and two tangential sections, and measuring accurately before and after drying in an oven. By submerging this same block in water before and after drying and measuring the water displaced its volumetric shrinkage may be determined. It should be remembered that figures obtained in such experiments may vary from accepted standards which are averages of many pieces from a number of trees.

When studying woods numerous examples should be given at the proper time showing how such study may be of practical value to the thoughtful worker. From the fact that plain or tangential sawn boards when dried evenly tend to warp away from the center of the tree, it can be seen why such pieces warp in a direction opposite to the curve of the annual rings. Therefore, when gluing together wide boards the finished piece is less liable to warp if the annual rings of the successive pieces curve in opposite directions. Many examples in cause and effect similar to the above should be given to the class for solution.

To indentify a wood under the microscope it is necessary first to determine the class to which it belongs. The wood of exogenous trees is divided into three classes depending upon the presence or absence of pores and their distribution. Pores, seen by examining cross-sections with a lens, are distributed in the annual rings. In "ring-porous" woods the large pores are in the spring wood only and when seen on a stump they appear in rings. In "diffuse-porous" woods the pores are equally distributed thruout the annual rings. Only the so-called hard woods have pores. Soft woods are "non-porous", but they contain resin ducts which are similar to pores in appearance but are far less numerous.

[1] According to Sargent, the weight of one cubic foot exposed to 100°C until it ceases to lose weight.

EDITORIAL

IT is gratifying to be able to record the fact that since our announcement in April we have been almost constantly receiving words of approval of our action in combining into one monthly magazine the two bi-monthly magazines, *Vocational Education* and the *Manual Training Magazine*. And it is still more gratifying to record the fact that not a single subscriber has expressed words of disapproval. It is a real source of strength to the editors in their work to know that in such an important action they have the full and hearty approval of the subscribers.

It would be possible to argue that with the present issue we are bringing forth a new magazine; it has a new cover; it has some new features. But in the essentials of form, make-up, business management, motive and editorial staff it is the same as before. Changes have been made only after full discussion of new conditions and the present needs in the field. It would therefore be closer to the exact facts to say that the present magazine is the same magazine with a new impulse, an old friend with a new inspiration.

One feature of this new impulse which has manifested itself among the editors is a desire to state briefly and definitely some of the fundamental policies for which the magazine stands. In addition to the usual discussions by the individual editors, it is now proposed to present from time to time certain fundamental propositions which have been approved by all members of the staff. These will make clear beyond doubt the attitude of the magazine on certain important questions, and at the same time give the editors the utmost freedom in accepting articles which may not agree with the editorial opinion of the magazine. To illustrate what is meant by such propositions, and as a first statement of this kind, we present, without discussion, the following:

This Magazine favors:

1. A unified system of school administration.

2. National and State aid in order (a) to equalize educational opportunity and (b) to stimulate experimentation in the field of vocational education.

3. Departmental instruction and promotion by subjects in all grades above the sixth, whether the organization of the seventh and

eighth grades take the form of an intermediate school, a junior high school or remain as the upper two grades of the elementary school.

By such statements as these and the discussion of principles involved in them, we hope, in this department to help clarify educational thinking with reference to the manual arts and vocational training.

—Charles A. Bennett.

Commission on National Aid to Vocational Education

Nothing of greater importance educationally has happened during the past five years than the consummation of the work of the Federal Commission on vocational education. And it seems quite certain that the next five years will see no more significant educational changes than those which may be expected as the logical consequences of the forces which have been brought to a focus, so to speak, by the commission. Events have been shaping themselves gradually, unmistakably, and not too leisurely, for a convincing demonstration of the popular demand for action. It has been recognized for a long time that the boasted universal democracy of education in this country is neither universal nor democratic. Notwithstanding we have nominally provided a common school education for every boy and girl, we have all too complacently accepted the statistical evidence of but partial realization of even this minimum ideal.

Public sentiment seems now to have crystalized around the proposition that equality of educational opportunity means diversity and differentiation of courses of study. At a time when the only considerable demand was for an education to fit for the professions, a single main line thru to the desired destination answered all requirements. But as soon as it became understood that careful and extended training is useful in other callings as well as in the so-called learned professions, there began to arise a demand for a number of parallel and branch lines. And, to carry the figure a step further, the additional tracks are found to be necessary not alone to permit of new classes of traffic and schedules, but also to accommodate the immense increase in the volume of traffic stimulated by more attractive and more convenient facilities.

Whatever the reasons, a scandalously large proportion of our youth have permitted themselves to believe that it is worth while to leave school at the earliest possible moment, in order to engage in almost any occupation that offers, even without definite plans for the future and in the absence of any sort of equipment that would insure success. For many thousands of these young people the first great desideratum is a

little more judgment and common sense, which may be expected to come with a few added years of growth and experience, but the acquisition of which would be greatly facilitated by more education of the right sort. What they need chiefly is general education, general intellectual and moral development. For many other thousands there is a real need for specific technical training, looking toward direct increase in wage-earning capacity. Just what is needed to solve the myriad individual problems that arise no one can hope to say without much patient study, investigation, and experimentation.

What is of immediate significance is that the attempt to solve these problems has assumed the proportions of a "movement," and that it has reached the point of influencing state and federal action. By act of Congress, approved January 20, 1914, the president was authorized to appoint a commission of nine members "to consider the subject of national aid for vocational education and report their findings and recommendations not later than June 1." The following persons were appointed to serve as members of the commission:

Senator Hoke Smith, Georgia.
Senator Carroll S. Page, Vermont.
Representative D. M. Hughes, Georgia.
Representative S. D. Fess, Ohio.
John A. Lapp, director, Bureau of Legislative Information, Indianapolis, Indiana.
Florence M. Marshall, director, Manhattan Trade School New York, N. Y.
Agnes Nestor, president, International Glove Workers' Union, Chicago.
Charles A. Prosser, secretary, National Society for the Promotion of Industrial Education, New York, N. Y.
Charles H. Winslow, special agent, U. S. Bureau of Labor Statistics, Washington, D. C.

The commission organized April 2, 1914, by electing Senator Smith as chairman. On April 17th Ernest A. Wreidt, director, Public Education Association, New York City, was appointed secretary. An office staff of more than forty persons assisted.

On June 1st the commission made its report to Congress, after six weeks of strenuous activity which included a number of public hearings, conferences with representatives of all interested departments and bureaus of the federal government, examination of the results yielded by questionnaires, as well as independent study and research. The report was issued from the government printing office in August as H. R.

Document No. 1004, in two volumes: I. Report of the Commission, with text of the proposed legislation: II. Hearings before the Commission.

Summary of Recommendations. It is impossible at this time to attempt more than the briefest summary of the recommendations of the committee. It is proposed that national grants be given to the states for the purpose of stimulating vocational education in agriculture and in the trades and industries, to be applied toward the cost of training teachers, and toward the payment of salaries of teachers. Appropriations are to be made also to a federal board for investigations which shall be of use in vocational schools. The amount appropriated on account of salaries of teachers, supervisors, and directors of agricultural subjects is $500,000 for the fiscal year 1915-16, increasing to a maximum annual appropriation of $3,000,000 in 1923-24, and thereafter. Similar provision is made for salaries of teachers of trade and industrial subjects. For the training of teachers the amount is $500,000 in 1915-16, increasing to $1,000,000 in 1918-19, and annually thereafter.

Only schools of less than college grade, supported and controlled by the public, and designed to prepare boys and girls over fourteen years of age for useful or profitable employment in the callings designated, are eligible to receive government aid. All-day, part-time, and evening schools are specified. The national grants are to be disbursed thru state boards, which are to be designated, created, or determined entirely by the states. A federal board is provided for, consisting of the Postmaster General, and the Secretaries of the Interior, Agriculture, Commerce, and Labor, with the Commissioner of Education as its executive officer.

The conditions under which national grants are awarded to the states safeguard the proper expenditure of the money for the purposes designed, and insure minimum standards of efficiency. The national grants are to be based on the amounts expended by the states for the salaries of vocational teachers, or for the training of vocational teachers. For each dollar thus allotted from federal grants, the state or community, or both, must expend an equal amount for the same purpose, and in addition must meet all other costs of plant, equipment, and maintenance, including salaries of teachers necessary to complete well-rounded courses of instruction. Payments on account of national grants are to be made quarterly. The conditions under which aid is given make it clear that the purpose is distinctly to stimulate action on the part of the states,

and not to assume the burden of support by the federal treasury. There can be no question as to the soundness of the principle.

The Next Steps

The commission has done its work conscientiously and thoroly, and while there may be those who think they would have recommended otherwise under the circumstances, there seems to be no good reason why all forces should not combine now to do something. The report should be carefully studied, first of all. Not many persons will be able to find the time to read thru the volume of testimony taken at the hearings, but every reader of this magazine should secure a copy of Vol. I of the report and give it a careful reading. Those who are in a position to judge of the possibilities are of the opinion that the report of the commission will receive serious consideration at the next regular session of Congress, and it is believed that the prospect of the enactment of some legislation is good. It is highly desirable, therefore, that the intervening weeks be improved by all good friends of the movement to the end that the best possible laws on vocational education shall be enacted by Congress next winter. The editors of this magazine are glad to open its pages to a discussion of this subject, believing that there is nothing of greater immediate importance.

—William T. Bawden.

Two Questionnaires

At the present time when the intense interest in vocational education and vocational guidance is compelling educators to seek for accurate information regarding principles and practices in this field of school activity, the questionnarie method of collecting such data is certain to be utilized. Recently two questionnaries have appeared which are so markedly different in their aims and methods as to deserve editorial comment.

The first of these is a questionnarie sent out by the Committee on Vocational Education of the National Education Association. The Committee proposed to collect facts and opinions and to make these a basis for a report on "Terminology." It was hoped that the *proposed* terminology might become later the *accepted* terminology. It was apparently assumed that a general consensus of the opinions expressed would warrant the conclusion that the majority opinion was the correct one and therefore worthy of general adoption thruout the country.

Forty-three questions were submitted, arranged in nine "groups," each group being preceded by a careful exposition of the views of the

Committee. Both the report of the Committee and the "Proposed Terminology" were presented at the St. Paul meeting in July, 1914.

The second questionnaire to which we referred is one sent out by the U. S. Bureau of Education for the purpose of ascertaining from the high schools of the country to what extent the vocational motive is influencing the work of the schools, and what, in general, are the ways in which the problems of vocational education are being met. To secure this information, five questions only were asked.

It is worth while to note the contrast in the methods employed in these two questionnaires.

The N E A Questionnarie

The purpose of the N. E. A. Committee was to clarify the meaning of terms used in the literature and practice of vocational education, and, as above stated, to secure some measure of agreement on the definitions submitted. We are inclined to doubt the value of the results of this questionnaire on the following grounds:

The questionnaire seems to have been prepared, not so much to ascertain all pertinent facts and the unbiased opinions of those answering, but rather to secure such answers as would support a pre-conceived hypothesis. In other words the questions were so framed as to secure the answers desired.

As illustrative of this point we may note the questions in Group V, page 16 of the Report. The group is headed "Needed Distinctions." After a statement to the effect that "In the field of manual training, household arts and agricultural instruction, up to the present time there has been some confusion in aim" comes the question (No. 18), "Is there danger of confusion between manual training, household arts, practical arts and agricultural education, as carried on, and vocational education?" Question 20 reads, "Should these types of education be classified as general education *rather than* vocational education?"

After such "leading questions" one is not surprised to learn that (page 38), "A large majority agree that there is danger of confusion between manual training, household arts, practical arts and agricultural education, as now carried on, and vocational education. That is to say, many persons do not understand that the former of these types of education are general in their aim rather than specific and that the latter is specific rather than general. It were well, then, that this confusion be lessened so far as may be possible by an adequate terminology and by

a proper conception by the persons responsible for any one of these types of the difference between these types of education."

It is extremely doubtful whether answers to questions framed in this style and interpreted by a committee assuming the attitude of advocates rather than jurymen may be construed as an interpretation of the real state of public opinion regarding the subject to which they relate.

The U S Bureau Questionnarie

The questionnaire of the Bureau of Education is so brief and so purposeful that it may be given in full.

The United States Bureau of Education desires from high school principals information with regard to vocational training in their schools. For the purpose of this inquiry it is important to have information from all schools, whether so-called vocational courses are given or not. Will you therefore answer the questions below and return to this Office? Please make use of the inclosed penalty envelope, which requires no postage.

Sincerely yours,

P. P. CLAXTON,
Commissioner.

Name of high school.....
City or Town.....State .....
Information furnished by .....

Vocational Training:

1. To what extent has your high school definitely vocational aims, i.e., does it fit any of its pupils to take position as: Farmers?.....; home makers? .....; skilled workers in the building trades?.....; machinists?.....; stenographers and typewriters?.....; teachers?.....; salesmen?.....; dressmakers?.....; printers?.....; any other occupations?
2. What percentage of your pupils take vocational work of the kind indicated? .....
3. Relatively how much time do these students devote to vocational work as compared with other subjects?.....

Vocational Guidance:

1. Is any attempt made in your school to assist pupils in the selection of future occupations, by means of (a) Talks by principal or teachers on the different vocations, (b) Addresses by outsiders on the different vocations, (c) Trial vocational course to discover likes and aptitudes, (d) Vocational counseling by a public or private vocation bureau or similar organization, (e) English composition courses in vocational selection, (f) In any other way.
2. Has your community had a vocational or occupational survey, or does it contemplate such a survey? (Send us any information you can with regard to it.)

The tabulation of several thousand replies to such a questionnaire, received from all parts of the country, cannot fail to indicate both the status and the trend of vocational education and vocational guidance as

school functions. It is not our purpose to forecast what these answers may reveal later, but merely to state that, whatever the facts may be, they will be well worth the knowing.

Furthermore, we believe that such facts as these will be more stimulating to the progress of vocational education than will the attempt to standardize educational practice, when it is still in its early experimental stages, by formulating definitions.

—Frank M. Leavitt.

We are sorry to anounce the resignation of George A. Seaton, editor of the Shop Problems Department. He has found that other duties make it necessary for him to give up the work. During the entire seven years of this department in the *Manual Training Magazine,* Mr. Seaton has been in charge of it. His efficient work has been well known to our readers, and so much appreciated by them that all will regret that he must drop it. To gather and edit the material for this department, to re-make many of the drawings, as Mr. Seaton has done, and to do it regularly and promptly, year after year, in addition to one's regular school work is proof of ability and a professional spirit that is rare. We feel a distinct loss in the resignation of Mr. Seaton.

Mr. Seaton's place will be taken by Albert F. Siepert, assistant professor of manual arts at Bradley Polytechnic Institute. Mr. Siepert comes to the task with the best of professional training, being a graduate of Stout Institute, Bradley Institute, and Teachers College, New York City. He has had several years of teaching experience in both public and normal school work. Under Mr. Siepert's charge the department will enlarge its scope to cover shop devices and "kinks." Hereafter it will be known as the "Shop Notes and Problems" department.

OF CURRENT INTEREST

CONSTANT AND VARIABLE OCCUPATIONS.

THE Russell Sage Foundation has issued a pamphlet entitled "Constant and Variable Occupations and their Bearing on Problems of Vocational Education" which is intended to help in securing "a better fact-basis" for thinking and acting with respect to the problems of vocational education and vocational guidance. The pamphlet gives the results of an analysis of the occupational data published by the Twelfth Census for cities of more than 50,000 population. It covers 140 occupations, 20 of which are found to be constant in the sense that the number of workers in each is everywhere at least equal to one for each thousand people in the population.

The purpose of the analysis is to show that there are certain occupations which are common to all localities, while other occupations require many workers in some places and few in others. It was discovered, for example, that among men workers the occupation of being a barber is the most constant of all occupations. Thruout our cities there are almost invariably three barbers for each thousand people in the general population, and this remains true almost regardless of the varying social or commercial characteristics of the different cities. Likewise house painting must be carried on in every city while the paint may be manufactured anywhere. Shoe repairing is carried on in every city where shoes are worn, but the shoe manufacturing of the entire country may be confined to a few cities. The twenty most constant occupations for men in the larger cities are the following: laborers, retail merchants, clerks, draymen, salesmen, carpenters, steam railway men, machinists, painters, bookkeepers, waiters, engineers, printers, blacksmiths, masons, barbers, plumbers, street railway men, shoemakers, bakers. For women the following seven are in the same degree constant occupations: servants, dressmakers, teachers, saleswomen, laundresses, nurses, housekeepers.

If the lower limit is reduced so as to include all occupations employing more than one in 10,000 of the population in every city, 31 more occupations may be added to the list of men workers and 10 for women. For men these are, iron workers, commercial travellers, tailors, butchers, hucksters, physicians, lawyers, agricultural laborers, tinplate

workers, messengers, bank officials, tobacco workers, electricians, clergymen, janitors, wholesale merchants, hostlers, government officials, musicians, civil engineers, laundrymen, bankers, stonecutters, teachers, upholsterers, confectioners, gardeners, journalists, restaurant keepers, dentists, and photographers. For women there are stenographers, seamstresses, clerks, bookkeepers, milliners, boarding house keepers, musicians, retail merchants, laborers and telephone operators.

This analysis varifies the statement that the schools generally cannot make a mistake in giving more emphasis to the building trades, and seems to indicate that there are a larger number of fairly constant occupations than some would seem to suppose.

TYPOTHETAE TO COOPERATE WITH CARNEGIE INSTITUTE.

"The United Typothetae and Franklin Clubs of America, thru their Apprentice Committee, have arranged a close working alliance with the Carnegie Institute of Technology for technical instruction in printing." This is the important announcement made in the July number of *The Inland Printer* by Frederick W. Hamilton, national apprentice director for the Typothetae and the Franklin Clubs. By this action the committee officially recognizes the Carnegie Institute of Technology as an approved technical school of printing, and extends to it full cooperation and moral support. The Institute, on the other hand, officially recognizes the Committee on Apprentices as an advisory committee. This Committee will assist the faculty of the Institute in the preparation of the curriculum, will keep in touch with its administration, and help in the selection of students. It will meet with the faculty from time to time for the discussion of the curriculum and examination of students. It will also assist in arranging courses of lectures upon topics of interest to the students. With this cooperation the purpose of the Institute will be to develop the highest possible technical instruction in the graphic arts.

This new development of plans by the Committee of Apprentices means that their school in Indianapolis will be abandoned by them. Whether it will be maintained by local interest is not yet certain.

TRAINING AND EARNING.

The director of vocational guidance in Pittsburg, Pa., O. W. Burroughs, has recently presented in his annual report some figures

which may well be made use of in other places. These figures show the results of an inquiry among the former pupils of the Pittsburg schools who have been at work for a number of years. The purpose of the inquiry was to discover what relation formal education bears to earning power. While the inquiry covers only 133 young men and women, Mr. Burroughs believes that it fairly represents the situation.

Those leaving school below the eighth grade, average aged 14 years 6 months, started to work at a weekly wage averaging $4,96; at the end of four years were earning $10.79, and after eight years $13.25.

Those graduating from the eighth grade but not going to high school started to work at $5.96 a week; four years later were making $13.86, and after eight years $16.23. Their ages averaged 15 years and 4 months when they started to work.

High school graduates, average age 18 years and 3 months, started at an average pay of $10.73 weekly; after four years it went up to $17.77, and after eight years to $23.44.

Mr. Burroughs points out that unskilled labor is recruited from the ranks of boys who leave school at an early age. The report shows that a group of high school boys averaged only one change of job in four years, while eighth grade graduates averaged two, and those going to work below the eighth grade averaged three changes in four years, the averages holding true for change in nature of employment as well as change in employer. Mr. Burroughs says, "We ought to keep the boy under 16 in school—he isn't of much use or value anywhere else."

The School of Education of Teachers College, Columbia University, has abandoned all undergraduate courses leading to the degree of Bachelor of Science and becomes a graduate school offering only advanced curricula leading to the degrees of Master of Arts and Doctor of Philosophy. Admission will now be limited to those students who hold an approved bachelor's degree or who have had an equivalent training of at least four years beyond the high school. In the School of Practical Arts, however, undergraduate work will still be given, and a number of new courses are announced for this year for students specializing in household arts. These changes will have no effect upon opportunities for the study of industrial arts, except to increase their attractiveness by opening a wider and richer field of advanced work.

SCHOOL CRAFTS CLUB.

The twelfth annual dinner of the School Crafts Club was held at the Broadway Central Hotel, New York City, on May 8th, and proved a very enjoyable event. The shop teacher as he sees himself and as others see him was the subject of a talk by Dr. James P. Haney. The remainder of the program brought the rather novel treat of addresses from the Charter Members of the Club. These include a number of men who have for years been associated with the manual training idea and recognized as leaders in the movement. The brief notes of encouragement for the future from "The Boys of the Old Brigade" were much appreciated by the Club.

The School Crafts Club has had a very successful year, and the new officers are looking forward with confidence to the continuation and development of the important projects which are in hand.

—The Publicity Committee.

The new Russell Sage Foundation Building, Lexington Ave. and 22nd St., New York, will contain the largest library in America, devoted exclusively to social problems. It will be a combination of the collections of the books and pamphlets belonging to the New York Charity Organization Society, the Association for Improving the Condition of the Poor, the New York School of Philanthrophy and the Russell Sage Foundation. It will be known as the Russell Sage Foundation Library, and will immediately contain 10,000 books and approximately 15,000 pamphlets. Vocational training is one of the subjects on which this library is collecting material.

Various phases of the compulsory continuation schools which are starting in Boston this month have caused much discussion in the School Committee. The chief question was that of salaries. At a recent meeting W. Stanwood Fields, director of Continuation Schools, asserted that a new schedule must be adopted if suitable teachers were to be obtained. His contention was firmly upheld and the following schedule adopted:

Instructors and trade instructors in continuation schools, $1,236 for first year, with a yearly increase of $72, and a maximum of $1,524. Trade assistants will receive $996 the first year, with an increase of $72, and a maximum of $1,284. Assistants will receive $840, with a maximum of $1,344. Two years' experience will be required for these schools.

STATE NORMAL SCHOOL OF MANUAL ARTS AND HOME ECONOMICS, SANTA BARBARA, CALIFORNIA. VIEW INSIDE THE COURT.

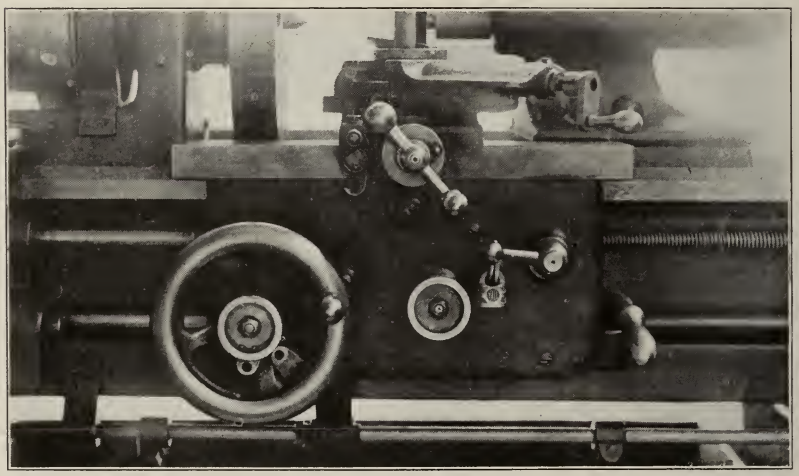
A CLOISTER VIEW.

In the October, 1912, issue of the *Manual Training Magazine* we published the floor plan and the architects perspective view of the State Normal School of Manual Arts and Home Economics at Santa Barbara. We now present two photographs of this picturesque building. The editor of the journal of the American Institute of Architects is quoted as saying that this building is the most distinctive public building, architecturally, with which he is familiar. To add to its beauty it occupies a site between sea and mountain, on the hill-side terrace next above the old Santa Barbara Mission.

SHOP NOTES AND PROBLEMS

ALBERT F. SIEPERT, Editor.

The Shop Problems department of the Manual Training Magazine has been a vital force in the field of handwork thru the character of the material presented. Many teachers have found it one of the most helpful features of the magazine and turned first to its pages as each number was received. The combined magazine offers a wider scope and a greater opportunity for service. To that end the problems presented will be selected with a view to meeting the needs of teachers working under a variety of conditions. It is hoped that material may be given setting standards for teachers and pupils as well as indicating what is best in current practice. Sometimes a teacher owes much of his success to the fact that he has discovered certain "kinks" which, if known, would prove helpful to many other teachers. This department will seek to be the means of communication with reference to such matters and to that end invites contributions. They should be addressed to Albert F. Siepert, Bradley Polytechnic Institute, Peoria, Illinois.



NO MORE BROKEN FEED PINIONS.

Recently I have discovered a very simple method of preventing the breakage of feed pinions. As shown in the cut, there are two ears fastened to the wheel and the feed knob. When the feed is out they are opposite, also the lock hangs on a stud screwed into the apron and locks the feed nut open. I always keep the lock one place or the other, and find it much easier to move the

lock to suit the workman than to fix the lathe after he has gotten in both feeds and broken the feed pinions. —F. F. Hillix, Stout Institute.

PROBLEMS.

In February a competition was announred in the Manual Training Magazine. The names of the prize winners appeared in the June issue. The problems given this month are some of those selected as worthy of their respective prizes. Space permits but a limited number, but others will appear in future numbers. The judges were governed in their decision by the following considerations:

(1) The rules of the competition made it necessary to bar a considerable number of drawings because they conformed in no way to the requirements. (2) Suitability for the grade indicated. Here the boy, his ability, desires and interests were considered. It seems safe to say that it is neither honest nor good teaching to have the stock for a library table glued up, surfaced and sanded at a mill, so that the seventh or eighth grade boy can somehow assemble and stain the piece, after which he exhibits it as all his own work, when he has not yet mastered the first essentials of tool technique necessary to produce a piece of work. (3) Some of the problems gave evidence that they afforded an opportunity for typical uses of the tools involved, contrasted with some requiring only special uses of tools. In such cases the former were selected. (4) Material or construction involved. Some projects violated principles of good construction or used wood as the material when metal would have been far better for the use intended. (5) The element of design for the sake of pleasing proportion or outline had to play its part. (6) Aside from these factors the worth of the problems as a means of making the pupil a thinking doer was considered.

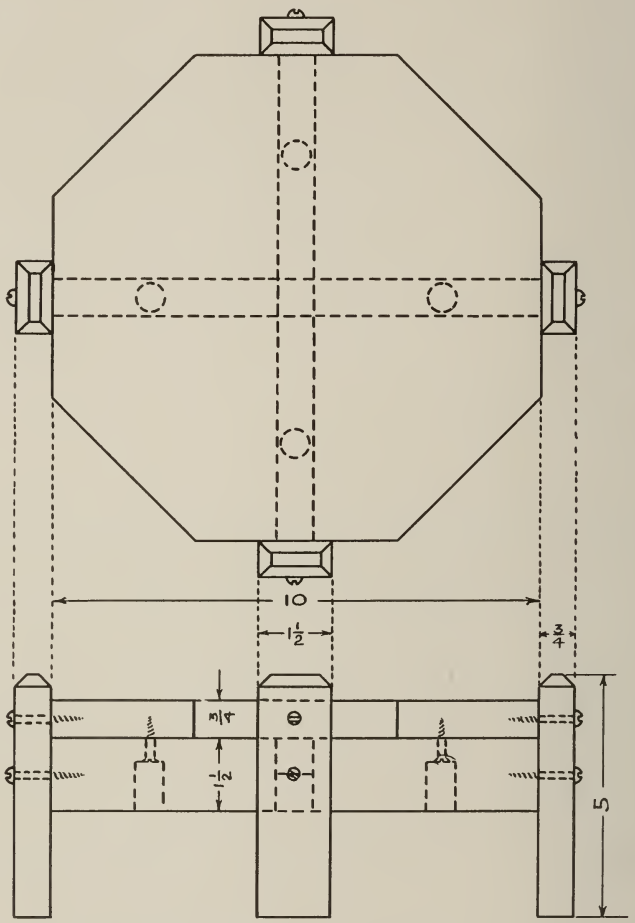
A FERN STAND—First Prize, Class A.

This model has been very popular with us in our sixth grade work, but, considering existing conditions in most schools, I believe it would fit into the usual seventh grade work to the best advantage.

When analyzed, the fern stand resolves itself into a very simple problem if the boy has previously mastered (to a certain degree) the fundamentals, sawing to a line and squaring up stock. We first cut out stock for the top, square it, then cut the corners to produce a perfect octagon. The two pieces for the half-lap joint can be cut out in one piece, as also can the stock for the four legs.

The many possibilties in this model are apparent: The combined use of auger and gimlet bits; the auger-bit holes in the cross-braces must be large enough to admit the screwdriver readily; the gimlet holes must receive the 1½″ No. 10 screws in the usual way; the four legs must be the same size and must be fastened squarely or the stand will not rest even on a level surface.

M. J. Sherwood,
Western State Normal School, Kalamazoo, Mich.



FERN STAND

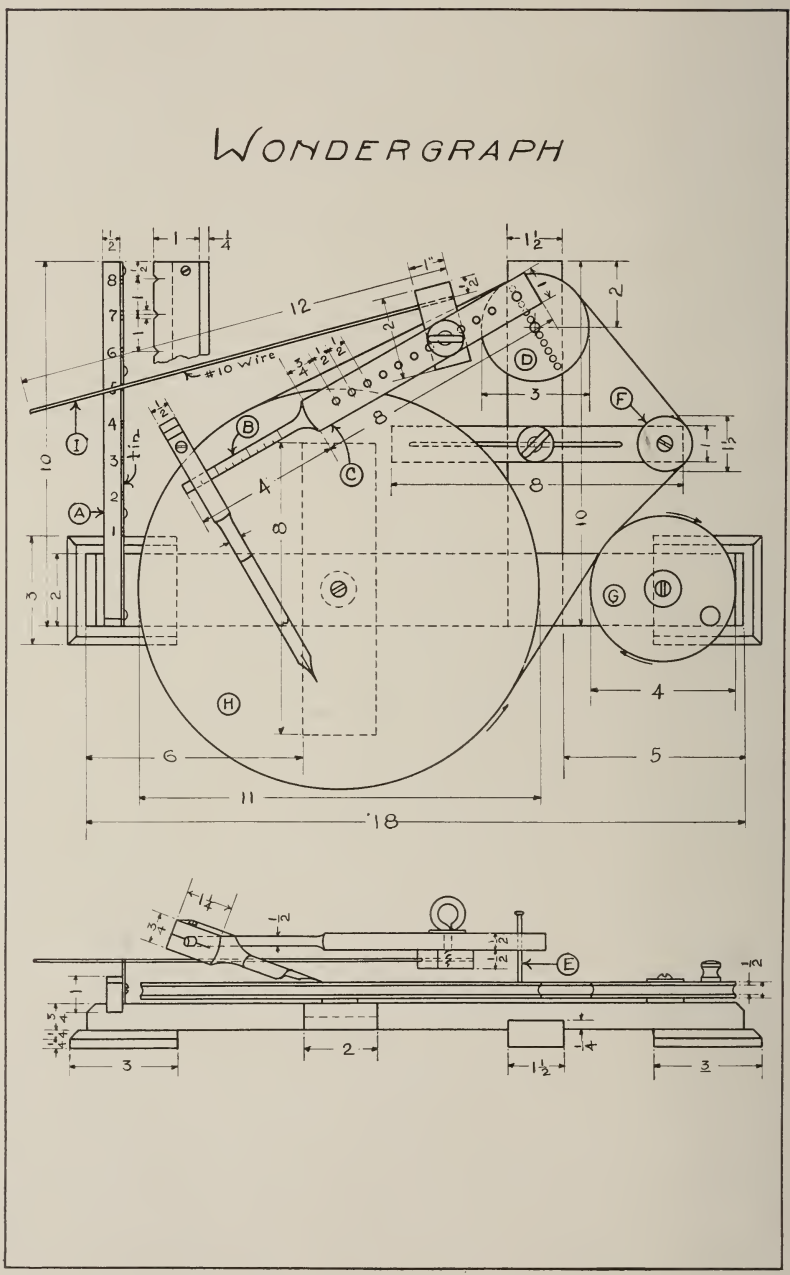
WONDERGRAPH—Second Prize, Class A.

The wondergraph is one of a number of "mechanical" projects which the seventh grade pupils in the Elementary Department of the Winona State Normal School have greatly enjoyed making and using for a number of years. Some mechanical problem which has a "go" to it is taken up each year as part of the work in manual training, and this seems to work out best in the seventh grade. This device is patterned after the machine used in the engraving department at Washington, D. C., for engraving the bank note designs, and produces designs which resemble them, tho they are not so intricate. This particular model is the most satisfactory one of a number worked out by the contributor, all involving the same mechanical principles. An issue of *The Pathfinder* in 1908 contained an illustration from which this was developed. The one then illustrated is much smaller and simpler and is now on the market selling for $1.00.

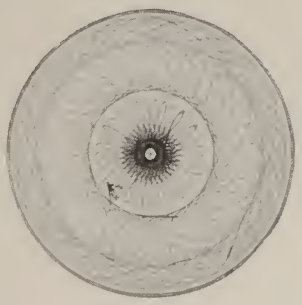
In adapting its construction, the tool processes involved which the average seventh grade boy can successfully perform were kept in mind. A glance at the plans will show that the laying out and shaping involve measuring, marking, planing, squaring up, straight and curved sawing, chiseling, boring, filing, and fitting that is not too difficult.

The base is made by fastening the 8″ cross piece to the main piece 6″ from the left hand end, using a half-lap joint. The two arms are fastened by dado joints. A strip of tin 1″x10″ is notched and tacked to the inside of arm A. Arm C is rounded to ½″ for a distance of 4″ and divided into quarter-inches for 3″. The other part has quarter-inch holes bored as indicated. The arm supporting the idler wheel F has a quarter-inch slot, sawed thru which a large screw-eye passes to hold it to the other arm at whatever place is necessary to tighten the belt sufficiently to turn all the wheels as wheel G is turned. The wheels H, D, F, G are made of half-inch boards and have a quarter-inch groove chiseled or filed in the edge for the belt. Wheel H forms the revolving turn table on which the paper is fastened. It is fastened to the base with a 1″ flat head brass screw countersunk flush with the surface. Drive wheel G is fastened with a 1¼″ round head blued screw using a washer. Wheel D has shallow holes in top side for nail E in arm C to fit into and may be fastened to the arm with wire nail cut off flush with its surface. All wheels should revolve freely, but not have any play if accurate designs are desired. The pen holder should be about 2½″ long. A half-inch hole is bored thru the thickness ⅝″ from the end, the hole for the screw bored, and then a saw-cut made as indicated, and after whittling the other end to fit the ferrule of an ordinary penholder it is fastened to the rod B by tightening the screw.

To operate the wondergraph secure a strong light cord for a belt. Pass it around table H and wheels D and F and once around drive wheel G in the direction of the arrows. Fasten paper on table H with thumb tacks, dip pen in ink, see that wire rod is securely fastened to arm C in one of the holes; then place rod I in one of the eight notches in rack on arm A, the point of nail E in one of the shallow holes in wheel D and turn wheel G clockwise until design is completed. If it is necessary to dip the pen in ink again before the design can be completed, remember to return to same place and design can then be


WONDERGRAPH
#10 Wire
A
B
C
D
E
F
G
H
I
12
10
8
6
5
4
3
2
1
11
18

completed. By using other notches in arm or by using other points in B C or D a different design will be made. By using all the possible variations and combinations, over five trillion designs can be made, no two of which are exactly alike. When a satisfactory design has been struck it is a good plan to note the adjustment so that it will be possible to reproduce it if desired. The notation of the instrument as appears in the drawing would be beginning with arm A 5, B ¼, C 8, and D 4. A quarter circle on which degrees are marked and fastened to the block which holds the wire to arm C makes this recording much more accurate.



It is an exceedingly fascinating piece of mechanism and the boys will work with it by the hour trying new combinations and watching the results.

—J. H. Sandt,
State Normal School, Winona, Minn.

THE NAIL AND SCREW TRAY—First Prize, Class B.

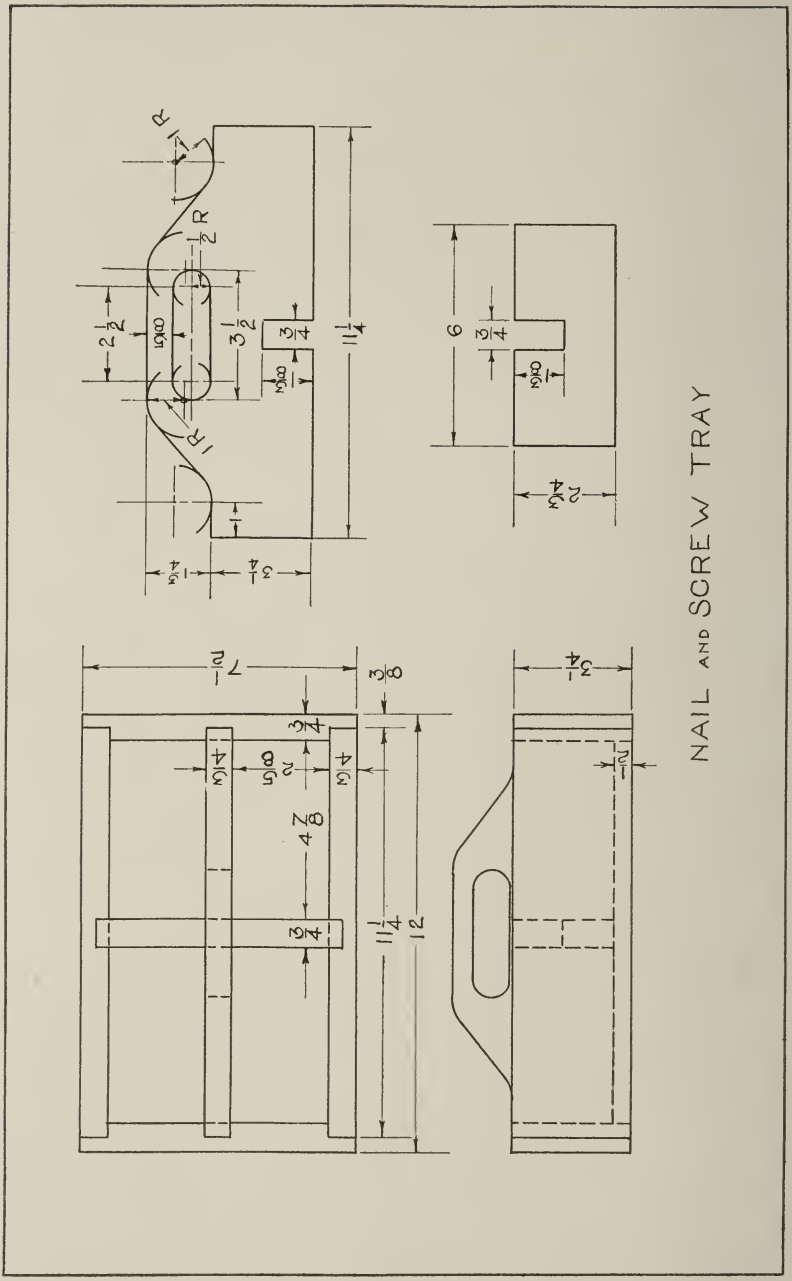
The problem of the nail and screw tray has been used with considerable success in the first year of the Viroqua High School. It was given in connection with a short course in joinery, involving laying out with knife lines and gage lines for half lap and mortise-and-tenon joints in soft wood. Owing to the fact that over half of the class of twenty-two were from the country schools, the work had to be simplified a great deal. It is very desirable with this type of class that the problems be very practical, as many of them will be taken to the homes of the boys where the worth of the work will be considered more from the practical than the educative or technical standpoint.

It is very difficult to impress upon these pupils the necessity of working to a dimension. Most of them had never thought of working to 1/64″ or 1/100″ and continually persisted in measuring with the ruler flat instead of on edge. Hence it is unreasonable to expect any results at all unless the problem is introduced by the most explicit directions and drawings.

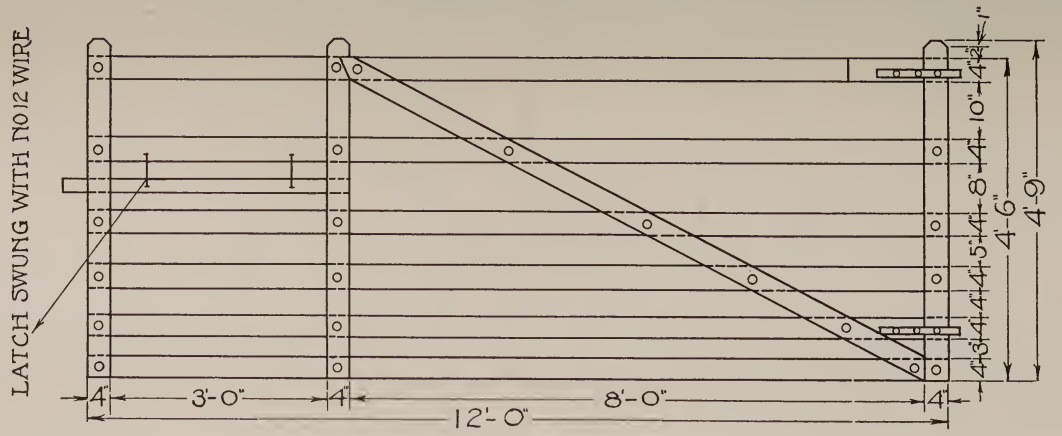
No pupil should be allowed to go ahead laying out the lines for the joints, etc., until every piece is marked O. K. by the instructor; then before going farther the pupil should be able to give in good clear statements, just the steps he expects to follow in laying out the corner rabbeted joints, and the dadoes at the ends of the partitions. —C. H. Oltman, Viroqua, Wis.

FARM GATE—First Prize, Class C.

Our work is mostly practical farm problems. We have our Freshman class making a farm gate since our boys are mostly farmer boys. Our class is divided, having sixteen boys in each class. Each boy makes a small model gate to a scale and the four boys making the four best gates were appointed as foremen of a group of four. Each group tries to make the best gate and this


NAIL AND SCREW TRAY

FARM GATE



MATERIAL

6-$\frac{7}{8}$"×4"×12'-YELLOW PINE 5-$\frac{7}{8}$×4×10 YELLOW PINE

22 CARRIAGE BOLTS $\frac{3}{8}$×2$\frac{3}{4}$ WITH $\frac{5}{16}$ WASHERS

4 CARRIAGE BOLTS $\frac{3}{8}$"×2$\frac{1}{4}$" 2 CARRIAGE BOLTS $\frac{3}{8}$"×3$\frac{1}{2}$"

2-14" SCREW STRAP HINGES 1 QUART BARN PAINT

is decided by the general average of their daily grades and the bench work grades.

We made arrangements with our hardware dealer to furnish the bolts, hinges and paint to even up with the boy's labor. The dealer and the school each pay one-half the cost of the lumber. He sells the gate for $3.50, and the profit is divided equally between the dealer and the school. The profit that we get from these sales is used in getting the necessary equipment for the shop.

The boys, understanding this plan, labor manfully, and not only practice in making farm gates but they feel that they are doing good work in making the equipment better. These boys work two double periods each day and make gates from the middle of February to the first of March. Then we take up concrete work.

We expect to make at least four dozen gates this year. A previous year we made two dozen gates, and the dealer could have sold twice that number.

The plan is a success and we feel sure other schools will be pleased if they try it. —E. E. Sowers, Jackson, Ind.

PEDESTAL—First Prize, Class D.

This high school project may be made of cherry or red gum. If finished natural the whole pedestal, excepting the base, may be completed on the lathe.

The post design and top are merely suggestive, yet they involve simple turning easily within the capabilities of the first-year high school boy. In fact it has been worked out very successfully by advanced eighth grade boys in our shops.

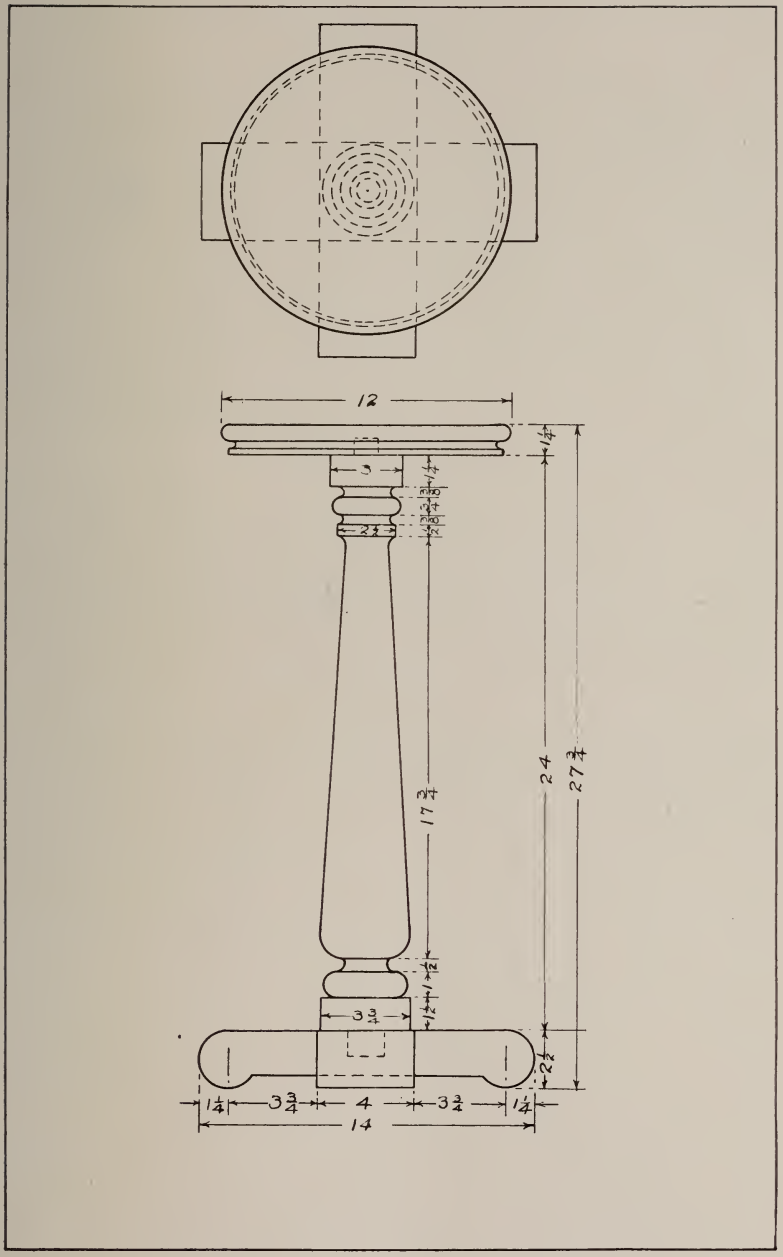
The base may be cut on the band saw, and finished smooth with spoke shave. The middle lap is then cut, and the two pieces fitted. Next bore the hole for tenon left in the turning of post. Do the same with the top and assemble with glue and clamps only.

The problem gives opportunity for ample experiment in straight or spindle turning, as well as face-plate work. In the latter respect it is much better than merely cutting out a circular top on the band-saw. The one involves comparatively no skill, and the other, considerable skill.

—L. Day Perry, Joliet, Ill.

TO TRUE UP AN OILSTONE.

Every shop acquires oilstones that get out of true because of the way boys use them. An easy way to true them up is to place a piece of garnet paper (the kind used on sanding machines) on a bench or any level place and then grind the stone to a new plane surface by a circular rubbing motion. This leaves the stone as good as new in a very short time.


12
1¼
3
¼
3⅜
2⅜
17¾
1½
1½
3⅜
2½
24
27¾
1¼
3¾
4
3¾
1¼
14

REVIEWS

Problems in Carpentry. A course in practical carpentry for manual training classes by Louis M. Roehl, director of Farm Mechanics, Milwaukee County School of Agriculture and Domestic Economy, Wauwatosa, Wis. Webb Publishing Co., St. Paul, Minn., 1913; 8¾x7½ in. oblong; 112 pages; price, $1.00.

During the past few years a large number of experiments in teaching the elements of house carpentry have been carried on in grammar schools, high school and vocational schools in the states of the Mississippi Valley. When these experiments began nearly every teacher had his pupils make frames of barns and houses out of small size material, the most common scales being one fourth size and one-eighth size. In a few cases small sheds for tools or bicycles were built with full-size materials, with the result that every teacher recognized the superior value of working with full-size material. From the standpoint of practical tool experience there seemed to be no other way, but not every teacher could find such a small structure to build.

Then came the suggestion of Clinton S. Van Deusen to build a very small structure inside the shop but to make it of full size material. This was a success and out of it seems to have grown the idea of building several corners or sections of buildings and to select these so that a series will comprehend all the fundamentals of house carpentry from framing to trim. Such a scheme of instruction has been most successfully worked out by Mr. Roehl, and that is what is presented in detail in this book. It is well illustrated with both line drawings and photographs, and is sure to be helpful to many teachers.

Bookbinding for Beginners. By Florence O. Bean, Assistant in Manual Arts, Boston Public Schools. With Introduction by Frank M. Leavitt, The University of Chicago. School Arts Publishing Co., Boston, 1914; 6x9 in., 83 page; price, $1.00.

This is a handbook for teachers of the lower grades of the elementary school. The first few pages are taken up with an introduction, a forward and some good advice by the author. Then follows a statement of equipment and materials needed for the work, and fourteen typical problems. The treatment of these is brief rather than comprehensive. It is a preparatory course for bookbinding rather than bookbinding itself, which, of course, is just what it should be. It is written from the school point of view, and is therefore practical for school use. The art correlations are sane, and the selection of problems is especially good to meet ordinary school conditions. It is a fine book, and it goes without saying that any book published by the School Arts Publishing Co. is attractive in appearance.

Shelter and Clothing. By Helen Kinne and Anna M. Cooley. The Macmillan Company, New York, 1914. 7½x5 in., 377 pages; illustrated; price $1.10.

Part first of this book considers home ideals and sets forth the characteristics of right living. It leads to the construction of the house, discussing location, ventilation, heating, lighting, decoration and furnishing. These chapters are

so untechnical that they can be understood by the high school student, yet they give a solid basis for work, and may be supplemented by outside reading if desired.

The second part of the book deals with textiles and clothing. The reasons for study of textiles are clearly set forth, and the textile industry from fiber to fabric is carefully considered. Physical and chemical properties, together with physical and chemical effects are carefully included in the study of each fiber, and much comparative work is done.

The last section comprises the study of commercial and drafted pattern, garment making, millinery, care of clothing and economics of dress. Drafting patterns is given with purely educational motive. Freedom in the use of all patterns is encouraged and ability to adapt patterns to individual needs is developed. Garment making begins with simple underwear and later deals with all types of dress such as middy blouse, gymnasium suit, lingerie waists, tailored waists, skirts and dresses.

Millinery chapters treat of proper style and color, selection for the individual, construction of frame from pattern or wire, covering, finishing and trimming hats.

Domestic art teachers have all hoped for a textbook to aid in the teaching of their subject. *Shelter and Clothing* fills this long-felt need. Every phase of the subject is treated clearly and definitely. The book is written by topics and if it seems unwise to study it in sequential order, it is very easy to separate these topics to comply with any course of study or to meet the needs of any locality or class. —Minnie A. Peterson.

RECEIVED.

The Public School System of Gary, Indiana. By William Paxton Burris, Dean of College for Teachers, University of Cincinnati. Bulletin No. 18, 1914, issued by the United States Bureau of Education. Price, 15 cents at the Government Printing Office, Washington, D. C. The result of a careful study of the Gary system of school organization.

Vocational Education in Indiana. By William Frederick Book, Deputy Superintendent in charge of vocational education. Bulletin No. 6, issued by the Department of Public Instruction, Indianapolis, Indiana. The purpose of this bulletin is to give superintendents and school boards the help needed to enable them to organize and conduct vocational work in accordance with the standards and principles approved by the Indiana State Board of Education. The bulletin contains 48 pages.

Regulations Covering Vocational Agricultural Schools and Departments in Indiana. By William Frederick Book. Bulletin No. 7, issued by the Department of Public Instruction, Indianapolis, Indiana. A pamphlet of 15 pages.

A List of Helpful Publications Concerning Vocational Education. By Lewis A. Wilson, specialist in industrial education, Albany, N. Y. Bulletin No. 569, issued by the University of the State of New York.

Annual Report of Public Continuation Schools of Wisconsin. Prepared by Warren E. Hicks, state supervisor of industrial education. Bulletin No. 7, issued by the Wisconsin State Board of Industrial Education. This is a very comprehensive report of 245 pages, and contains many statistical tables, as well as detailed reports from the cities in Wisconsin that have established continuation schools under the recent law.

The Massachusetts Home-Project Plan of Vocational Agricultural Education. By R. W. Stimson, agent for the State Board of Education. Bulletin No. 8, 1914, issued by the United States Bureau of Education. This is a well illustrated and very comprehensive report of 104 pages.

The School and the Start in Life. By Meyer Bloomfield, director of the Vocation Bureau, Boston, Mass. Bulletin No. 4, 1914, issued by the United States Bureau of Education. This is a study of the relation between school and employment in England, Scotland and Germany.

The Selection and Training of Teachers for State Aided Industrial Schools for Boys and Men. Bulletin No. 19, issued by the National Society for the Promotion of Industrial Education. This is the report of the committee of which A. Lincoln Filene, of Boston, was chairman. It is by far the most comprehensive and valuable presentation of the subject that has ever been prepared.

Two Sides of the School Question. Pamphlet No. 231, issued by the National Child Labor Committee, 105 East 22nd Street, New York City. This contains two articles, the first on the "Cooperation of the Schools in Reducing Child Labor," by Frank M. Leavitt, the second, on "Heckling in Schools," by Dr. Edward N. Clopper.

Decoration for Rural Schools. By Royal B. Farnum, of the University of the State of New York. This is the April, 1914, number of the Cornell Rural School Leaflet. It is an admirably prepared and illustrated pamphlet and ought to do a great amount of good. It is in harmony with high ideals of school decoration and at the same time is full of helpful, practical suggestions.

Vocational Guidance. Bulletin No. 14, 1914, issued by the United States Bureau of Education. This contains the papers presented at the organization meeting of the National Vocational Guidance Association at Grand Rapids, October, 1913.

School and Home Gardening for Use in Primary Grades. Bulletin No. 31, 1913, issued by the Bureau of Education, Manila, Phillippine Islands. This is in harmony with the many excellent pamphlets issued by the Philippine Government.

Report of Consultative Committee on Practical Work in Secondary Schools. issued by the Board of Education of England in 1913. For sale by Wyman & Sons, Fetter Lane, E. C., London. Price, 1s, 9d. This is a comprehensive report of 411 pages, including the evidence of witnesses utilized by the committee.

MANUAL TRAINING AND VOCATIONAL EDUCATION

OCTOBER, 1914

THE DAY VOCATIONAL SCHOOL

E. W. Boshart

IN every discussion of educational topics there comes an ever increasing emphasis upon vocational education. Associated with this emphasis are various suggestions as to how the work can be best effected and administered. Today, as never before, educational authorities are endeavoring to solve this problem which means, as I am able to see it, a readjustment of materials, methods, and courses of study to suit the needs of the masses. The thought of such readjustment strikes fear to the minds of those whose basis for educational development rests in past customs rather than well defined purposes and aims which are the result of scientific investigation and experiment.

Dr. David Snedden, Commissioner of Education for the State of Massachusetts, has well described the change of basis and method of accomplishment for our educational endeavor in his recent book, "Problems of Educational Readjustment." While he does not wish, in any way, to discredit the work of the past in its legitimate influence in guiding future experiments, he holds that the vital problem is to prepare the present school population to meet the life which it must live with all the efficiency and self-sustaining power possible. He has divided education into two parts, namely vocational and liberal, and defines them briefly as follows: "Vocational education is designed to make of a person an efficient producer; liberal education may be designed to make a person an efficient consumer or user."

Here we have set at opposite ends of a scheme, two diverging elements, as I see them. While agreeing that there is a need for this separation, I like the idea of a good solid basis upon which to rest this branching tree and, in so far as possible, I should hope for a resulting

influence that would bind these together in such a way that man's culture and growth may be encouraged and not blighted when the preparation for his vocation is started in earnest. Certainly, no one would consider any aim worthy of the attention of our schools that did not encourage the efforts of pupils to secure the highest appreciation of life and its meanings. Consequently we must hold to the acquirement of as high a degree of culture as is possible to be attained from the environment of our schools. In this connection, I would like to have culture defined as given by Dr. John A. MacVannel, "Any man is cultured who in doing his work is capable of reflection on the meaning and significance of his work."

For a long time we have been conducting vocational schools which have prepared a small percentage of our school population for what are termed the more important vocations, as medicine, surgery, law, the ministry, and school teaching. In every scheme of preparation there has entered a large element of "culture" which has been intended to give that perspective of life suggested by Dr. MacVannel. This has been necessary in order to prevent the narrowness that is likely to follow a concentration upon one element of life, the results of which we may see indicated by those who are following a particular vocation and at the same time advising young people, even their own children, to select a different line of life work. In opposition to this, we find that those men who have become able to reflect upon the meaning and significance of their work are encouraging others to follow the life work which they have selected. It is this larger view of things that I am hoping to see inculcated in all our school life. If this is not attempted, what hope is there for the vast army of workers whose only outlook upon life is that they are a part of the machine they operate; that if they are able to produce the required amount of finished product they will receive a definite wage; and that if their health becomes undermined the family must suffer?

RECOGNITION OF A NEED

In the face of all opposition of the past against the necessity of educating the masses of our young people for vocations, there has been a steady counter current that is so strong that its influence can no longer be made light of. Our people are no longer satisfied with the haphazard lot to which they are subjected when forced to take the first position offered without any preparation whatsoever, or to employ those whose

preparation must be waited for, before they can become of value. Groups of individuals, corporations, local communities, various states, and even our federal government are now at work seeking a solution of the problem.

One of the solutions offered is the day vocational school where individuals may secure a preparation for their life work. From the definition stated above, this must permit the careful study of, and practice in, the individual lines of work practised in the community. Judging from the experiences of the past, I believe that we may be guided in determining, to a degree, what the purposes and aims of the day vocational school should be. From the earliest foundation of American practices relative to preparation for vocational ends, we find that the requirement was that the apprentices and children be taught the calling of the master and father. The next step forward was that in addition to being taught a trade, instruction was to be given in reading, and a little later writing was added to the list of requirements. Later as schools were established the apprentices and children were to be taught trades by the masters and fathers who were required to see to it that their charges were sent to school where they were to be instructed in the mysteries of the three R's.

With an increase in the possibilities of industry and the efficiency of the schools, there appeared a branching of the ways, where each took unto itself specific problems as it saw them. The divergence of the ways has increased until there seems to be no existing relationships where the efforts of these two phases of society are concentrated upon the upbuilding of the masses. Later the complaint arose that industry could no longer prepare its apprentices and the preparation given by the school was inadequate and not suited to the needs of industrial workers. We have examples of attempts at meeting this difficulty by the introduction of manual training in the schools. We know that some of these attempts have been more successful than others, which have been pretty much of a failure. By a thoughtful study of the various attempts we are led to recognize that successes have been due to the following: A thoughtful study of the situation; adaptability of attempts to meet community needs; a careful adjustment of vocationalizing and liberalizing elements.

To be sure, the results of most of these attempts are measured by a class that has been above the average of the masses and which has gone on to the larger fields of development thru the vision they caught of possibilities ahead. The reason for this may be assigned to the ad-

vanced period of school life in which the opportunities appeared when the benefits offered were attainable by the selected few.

On the other hand we find that industry cannot longer be satisfied with the unintelligent worker as may have been held in the past. It is certainly true that ignorance in any form cannot be dealt with as an asset in any phase of civilization, but will work detrimentally unless alleviated. The effort to overcome conditions surrounding dense industrial activity indicates a realized need.

Considering the demands of the past and how they have changed, we are led to believe that any attempts of the future must not tend to narrowness in our estimate of either vocational or liberal education. Considering the results of past experience, we are led to believe that the education of each individual must be so balanced that he may at its various stages be prepared for at least a degree of citizenship and self-realization. Considering the indications of the present, we believe that our object is to prepare the present school population for entrance upon a life career that demands on the part of each individual, to some degree at least, ability as a producer and a consumer. Beyond this point must come the realization of the selected vocation which shall largely control the education and training that shall follow.

In the light of these indications, it seems to me that we must give our attention to two phases of vocational education. First, that which will prepare the way for the judicious selection of a vocation and may be termed prevocational, and second, that which deals with a direct preparation in the one field and may be termed vocational. These two are so closely related that it seems hard to draw a line other than that suggested—the decision upon a particular type of work at which one will gain a livelihood. Therefore, we believe that the vocational day school should consist of these two elements.

The aim of the vocational school, of whatever type, must be to aid in the selection of a vocation and in the preparation to successfully accomplish its demands. Since the experiences of the past lead us to avoid narrowness, we are shown that our day vocational school must offer an opportunity to become familiar with the real workings of a type of work and its significance to the great body of society.

THORO STUDY OF CONDITIONS NECESSARY

In the establishment of the vocational school, it is essential that a careful study be made to determine the essential basis upon which all

developments can take place. In other words, this means a thoro knowledge of the community as to the various industries, the numbers employed in each, the proportion of skilled and unskilled employees, the conditions under which the work is conducted, and the demand placed upon properly trained workers. To get this, means a familiarity with conditions that can be obtained only thru a close contact with employers, employees, the officers of the local organizations of each, and the school authorities. Conferences with individuals representing various elements of the section, then later with a group of these representatives, seems the only possible means of realizing the situation. School authorities don't know unless they have made a study; the employer doesn't know of the situation outside of his own business; and the employe has little opportunity of looking into the facts. But by bringing together the ideas of those who should be interested, the best possible basis for organization can be formed.

Another great factor is to adapt whatever is attempted to the needs of the community. So often we find that without making a close study of the situation, authorities have attempted something that has been tried in other sections without giving thought to comparisons. The great idea seems to be to get something started, then condemn it without knowing why. The needs of one community are seldom exactly the same as the needs of another.

The main essentials or the methods of attack need not differ greatly, but the materials to be used and the organization of these materials into workable sympathetic units will be as varied as the communities in which attempts are made. It is at this point that team work is needed and the influence of an advisory board can be of great help in adjusting the types of industries that should receive consideration.

Wherever any work of this kind is attempted there will arise a need of selecting a limited number of units that will best serve the needs of the community, and great care must be exercised that each receive proper emphasis and at the same time attain as wide a circle of usefulness as possible.

The great task of the school authorities is so to harmonize the vocationalizing and liberalizing materials that all will work together in developing the strongest possible type of individual. To be sure, this has been said to be the aim of all types of education, yet we have not always attained it. All advocates of vocational education for the masses have been accused of narrowness and one sidedness. And I am

not so sure but some have merited much that has been said. A great deal of our vocational work of the past has been largely manipulative and to such an extent that I believe much of it should be labeled "training" and not "education." When a type of work is undertaken and all influence is thrown upon the manipulative side, the individual is being trained to higher degrees of skill without that knowledge of materials, their sources, their relations to mankind, and the part they play in the growth of society, we have an individual who might be likened to an engine without a fly wheel.

After selecting the types of industrial occupations to be made use of (and these will depend upon the community and its interests), it becomes necessary to select groups of subject matter that will serve as a complement in the formation of the curriculum. In all well governed schools, we find that emphasis is placed upon the acquirement of relationship thru reading, writing, arithmetic, history, and location. As stated above, our problem is to take these materials, not necessarily new ones, and organize them into a harmonious unit.

If we accept the promise that the selection of a vocation is essential before launching upon definite preparation for a life work, we must have several occupations from which selections may be made in what might be termed the try-out or prevocational period where classes can be rotated from one type of occupation to another as may seem best. Wherever the size of classes permit, the group or class should be maintained as a unit for instruction purposes in all lines of work. The instruction in each line should be given by people who are particularly qualified for that work and such unity should be maintained that all processes go forward in direct relationship, each giving support, one to the other.

The shop instruction must be direct, involving principles and applications adaptable to the best known and most up-to-date practices. All problems or exercises must require thought and application, leaving the development of the higher degrees of skill and speed to a later period. The work in English, history, geography, mathematics, and drawing should have its basis closely related to the industrial problems. This can only be accomplished by instructors who are familiar with type of problems and conditions and who are willing to attempt the reorganization of subject matter to meet the aims and purposes governing this type of education.

COORDINATION OF EFFORT

The following might help to make clear my meaning:

The mathematics and drawing should, where possible, be taught by the same instructor, for here much time might be saved. Problems arising in shopwork will suggest much, and in nearly every case these two subjects have many elements in common. I recall one simple problem in woodworking which required the use of twenty-four separate problems in arithmetic in the making of the drawing. Not all problems may have their basis as suggested, but it is surprising how many may be found if we will give it a thought.

The English, history, and geogrpahy should be taught by the same instructor unless the school is of such size that the time of one teacher might be well spent on English and that of another could be given to history and geography. In the case of English, it is best to draw largely upon the various phases of industry for themes in composition work. It is here that the pupil is thrown into a direct relation with real problems which are full of information and do not demand wild flights of the imagination to satisfy the vague requirements of the instructor relative to individuals, locations, and scenes that are far beyond the comprehension of those who have not had large opportunities. I believe that the greatest effort here should be the development of a love for good literature and a desire for the pleasure it will bring. This may best be done thru the selection of material bearing upon either the life of the community, a nearby industry, or descriptions of the life work of men and women who have had to do with the building up of its various branches. All this will involve much work on the part of the instructor, but rewards will appear. Reading for the enjoyment it gives is a strong motive to inculcate.

The matter of technical grammar is one that seems to be a great stumbling block. It is here that we must be judicious in the selection of material. The outline given in the New York State Syllabus is elastic enough to meet the needs, but here again the matter of reorganization and adjustment must form a large part. Technical grammar is usually not attractive unless there is found an incentive that is effective. Illustrations taken from daily experience and occasional expressions of pupils will prove interesting. Much oral expression is desired. This may be largely gained thru work in current events, and especially thru having all members of a class select material from magazines and other

sources that to them seem worth while to be known by all members of the class. Competitions in making selections, and the giving of reasons why a certain item is worthy or unworthy of attention, will develop a surprisingly good interest.

In the matter of geography, it is best to follow the lines of commerce and industry, using those things that are of immediate interest to the class as related to raw materials and finished products connected with various types of industry in the community. The matter of political and physical geography should be taken up as the influences or effects form a part of the study undertaken.

The matter of history and civics should be concerned largely with local, state, and national affairs until these features have been pretty well mastered. Later other work in history might be attempted but not until a need or motive can be found. The work should be taken up largely thru reasons and results, with attention given to demands which society places upon individuals as such and their responsibilities to the group.

The matter of physiology and hygiene should deal largely with healthy working conditions in the industry and the personal side of the equation. Too much attention cannot be given to this feature of the work. Here the individual should be taught the habits of personal and community regulations as well as the dangerous and safe conditions under which workers are found.

In the above the study of art and music has not been given mention; time and space will not permit much to be said in this connection. However, artistic possibilities should receive consideration in connection with all articles designed. The great part in the study of art and music in this connection would be that for appreciation rather than ability. The value of this can scarcely be measured, for it brings much to individuals who otherwise would be deprived of its benefits.

This puts in a brief way my ideal of the prevocational element of the day vocational school. The only difference that I would make in the change to the vocational element would be the direction of the shop side along the one type of work, placing greater emphasis upon the acquirement of higher degrees of skill and increased ability in productive fields.

The ideal vocational day school should contain the two elements, the prevocational and the vocational, with such an intermingling of vocationalizing and liberalizing elements as will make for the most

complete balance at the various stages of progress. It might also be said that the arrangement of subject matter into short units will be helpful in accomplishing this. It will give greater ease in the adjustment of materials to suit the needs of those who are limited in the time they can devote to a preparation as well as those who can remain for a longer period to obtain a well rounded preparation. In all of this work it must be remembered that there are three essential features which should control all attempts in vocational education: A thoughtful study of the situation before an organization can be completed; the adaptability of attempts to meet the needs of the community to be served; and the careful adjustment of the vocationalizing and liberalizing materials at hand.

HE THEREFORE SOMETIMES TOOK ME TO WALK WITH HIM, TO SEE JOINERS, BRICKLAYERS, TURNERS, BRAZIERS, ETC., AT THEIR WORK, THAT HE MIGHT OBSERVE MY INCLINATION, AND ENDEAVOR TO FIX IT ON SOME TRADE OR OTHER ON LAND.

—Benjamin Franklin: Autobiography

THE SUBJECT MATTER IN HOME ECONOMICS COURSES FOR HIGH SCHOOLS: FACTORS DETERMINING THE CHOICE OF SUBJECT MATTER IN A LABORATORY COURSE IN FOODS

Jessamine Chapman Williams

ALL high school courses have established a fixed kind and amount of subject matter and this is quite uniform among all high schools of the same rank. The courses in algebra and geometry, in physics and chemistry, in Latin, history, and English have been outlined definitely and must be covered in the time allowed.

The subject matter in home economics courses is still unsettled, and varies in almost every school in which it is taught. It is left to the teacher almost exclusively to choose the kind and amount of material and the method of presentation. She has full play to do as she chooses. She does not feel bound to follow any set course; she can use her freedom to initiate and express her own ideas, constructing a course to her own liking. This is of the greatest relief to the experienced, resourceful, ambitious, and conscientious teacher. Nothing could be worse for the young and inexperienced teacher or for the uninterested careless one. She needs a fixed course to follow or, at least, definite suggestions to stimulate and guide her.

Home economics, as taught in the high school, is still too new and undeveloped to have established a general and uniform outline of the subject matter, and to have required its adoption in all schools. When this is done, credits will be given in this subject as in others and the student may use this to count toward her diploma or in transferring from one school to another. Until some uniformity does exist it cannot be considered on the same basis with other high school subjects.

The ideal for all courses of home economics would be the presentation and direct application of all the laws and facts of value in related subjects in the high school course, but flexible enough to be adapted to the varying conditions found in each class of students, in each community, and in each status of society. The direct application of the subject matter of related courses, the technical skill developed, capable of practical use in the home, and the broad social and moral influence have proved the introduction of home economics to be worth while.

First, to consider the subject matter of a laboratory course in *Foods,* three points of view must be taken: the *pupil, her environment,* and the *school.* The ideal course must satisfy the needs of all three.

CONSIDER FIRST THE PUPIL HERSELF

Assuming that the course in foods is placed in the *second year* of the usual high school curriculum, what are the conditions found regarding the development of the student? What past experience and knowledge does she possess? She has had elementary physiology and hygiene in the grades; she has taken a course in general biology in the first year of the high school; she is taking physics or chemistry. This is the extent of her scientific training. She has had some elementary course in art (freehand drawing, water colors, or mechanical drawing), and the regular first year course in English, mathematics, history, and language. She will necessarily draw most from her science as past experience to use in her course in *foods.* She is awakening mentally from that dreamy, unanimated, self-centered stage in a girl's life and is becoming alert along social lines. She has developed a personal pride in her appearance and ability: she is striving to be attractive socially; she has developed certain ideas of beauty (crude they may be, but fortunately they will change later). All these ideas must be directed along the line of true education, but never subdued by it. These qualities will be valuable assets to every girl if properly guided.

Mental capacity must vary with each individual. Her talents, the time she can spend at school, the work to which she will be called afterwards, influence the course to pursue, but there must be a fundamental unity in any course that is planned. The ideal of *culture* is the same for all. "The ties of the *past,* insight into the *present,* anticipation of the *future,* character, liberty, respect for serious effort, law, health, goodwill, joy, beauty, truth, love of country, warmth of home" are what is sought. Too many leave school with a smattering of rainbow colored information. The best of life is work, and work means effort. Therefore in adapting a course in *foods* to the needs of the second year high school girl, let it not fail to demand *mental* and *physical* effort to the limit of her capacity. She must *think* and *work independently,* and produce results that show this. The method of presentation of subject matter by the teacher and the girl's method of study and application are important factors in the gaining of this goal as well as the choice of subject matter.

A logical *sequence* of subject matter—logical in the increase of difficulty and the number of facts presented, logical in the relationship the facts bear to other subjects of the curriculum, logical in the kind and complexity of manipulations, the physical movements, control of muscles, and the development of a muscular sense of feeling and touch—all are important for the development of the girl's capacity and talents.

The sequence of subject matter may be illustrated by the series of lessons in the study of starch. The principles and facts concerning starch cannot be taught by the laboratory methods in one lesson. The old pedagogical rule of proceeding from the simple to the complex, and from the known to the unknown, had best be followed. The first lesson in the study of starch will recall to the student's mind all his past knowledge and experience regarding starch; its appearance, commercial forms, sources, its uses, composition, method of identification, etc. Starch will be examined microscopically to understand its granular structure and to distinguish various kinds of starch. All these facts will be classified and a complete study begun. It is clear that little laboratory practice could be carried on in this lesson. The simplest practical work must be chosen to illustrate the effect of heat on starch. No doubt, *baking a potato* would be the simplest. Experiments on the starch from potato can be carried on during the baking. The manipulation in the first lesson is very simple—principally testing the temperature of the oven, placing the potatoes in the oven, and testing them for sufficient cooking. A comparison by means of the microscope is made between *cooked* and *uncooked* starch and emphasis put upon the bursting of the cellular walls of the granules. Little time is given to the serving of the potato.

In the lesson following, the effect of moist heat may be taken up in the cooking of the cereal, involving more difficult manipulations and sifting a dry substance into boiling water, without lumping, in the use of the double boiler, involving also additional knowledge concerning starch, in judgment regarding consistency, molding cereals, methods of re-heating, etc.

In a third lesson in the study of starch its thickening property may be studied, using for laboratory practice the making of a white sauce, showing the various consistencies and the use of each, the methods of combining the ingredients, the economy of time, and results obtained. This sauce may be used in teaching the methods of using left-over potatoes, individual dishes of creamed and escalloped potatoes being prepared by each student.

The fourth lesson may take up the cooking of rice and macaroni, starchy foods cooked in an excess of water; sauces using other liquids than milk, as tomato juice, soup stock, or cream, may be made.

As a summary lesson, the girl may be required to put all the principles, facts, and laws learned into practice in producing a cornstarch pudding molded with fruit and serving it with a thickened fruit sauce. One must avoid giving lessons involving the same facts; select only those which will teach the facts concerning starch and fundamental laws of starch cookery.

Note the development in manipulation, the increasing difficulty in the muscular movements and all they involve in this series of lessons.

PROCESS IN MANIPULATION IN A SERIES OF LESSONS IN THE STUDY OF STARCH

Lesson.	*Chief Manipulation.*
1. Baking potato.	1. Testing oven. 2. Testing potatoes for sufficient cooking.
2. Cooking cereals.	1. Sifting a dry substance into boiling water. 2. Using a double boiler.
3. Making white sauce.	1. Combining several ingredients, avoiding lumping. 2. Constructing an escalloped dish.
4. Cooking rice and macaroni.	1. Using an excess of water in cooking starchy foods. 2. Keeping food from breaking up and becoming soggy. 3. Using various liquids for sauces.
5. Cornstarch pudding with fruit sauce.	1. Use of the previous processes of manipulation.

Simply to glance at the above series of lessons in laboratory practice, one might not see any relationship at all or any logical order in the development of subject matter or in the processes of manipulation leading to technical skill.

Many teachers in a course in foods follow no planned sequence of any kind, the course being a hodgepodge of unrelated lessons. As one teacher was known to remark when asked what determined her sequence of lessons, "I usually begin with a lesson on cocoa and that leads to one on creamed cabbage." Some never get further than the

cocoa and creamed cabbage point of view. Many teachers see no further than to teach the processes involved in the making of a definite dish of food. They do not consider that the actual laboratory work done is but a means of teaching big fundamental facts, laws, and principles in the science of nutrition.

There is another phase of the question of sequence to consider. The pupil may wonder where all these facts and processes of manipulation will lead, what is the goal, what shall she try to reach. The pupil must have something specific, something visible, something to arouse her immediate interest in order for her to exert her best efforts. Why cannot a series of lessons, logical in relationship of subject matter, in development of skill, in increasing complexity, lead to the serving of a meal—one cooked and served as a test of the knowledge acquired? The course will not seem an aimless one to her then; she can place and view each lesson in its proper position and importance, and view it from the standpoint of the aim or goal to be reached.

THE ENVIRONMENT OF THE GIRL

In no other course is it more important that the subject matter taught be suited to the *girl's environment,* of the *home* and of the *community* in which she lives—her *social world.* These are the fields where this knowledge will be applied directly and for practical purposes. It must fit the existing conditions, therefore. Contrast the needs of two girls: one, living in an east side tenement house in New York City and attending a high school in that section; the other, living on Riverside Drive in Harlem and attending a high school there. The principles of *protein* cookery must be taught each girl. The principles of poaching an egg may be the illustrative material used in teaching the general facts and laws involved.

For the latter, to obtain her interest, to make her feel she is getting something worth while for her effort, not only the fact that the egg requires a temperature below boiling to produce a soft, jelly-like consistency and an even coagulation of both yolk and white, will suffice. She must know the best method of doing this, and the most attractive style of serving. She will prefer to poach her egg in a muffin ring to keep it in perfect shape, to serve it on a thin piece of toast, cut in circular form, browned very evenly, and buttered very generously. She will wish to serve this on a beautiful plate of just the right size and garnish

the dish with parsley. She may prefer to poach the egg in milk or tomato sauce instead of water and sprinkle with a little grated cheese. She will wax enthusiastic at the thought of preparing this sometime for her mother's breakfast tray.

For the former girl in a vastly different social sphere, many of these details of serving are impossible. Time and money must necessarily be considered. She needs to know the same general laws regarding the temperature and time in cooking protein food properly, and she needs the technical skill involved in the poaching of the egg, but the crusts need not be removed from her slice of toast, nor need the slice be so thin, nor need it be spread with butter, but with some good meat fat or softened perhaps with a little hot water, nor need it be garnished with parsley. There is no reason however, why she should not strive to make the egg attractive by cooking it so that it will be soft, jelly-like, evenly coagulated, properly seasoned, placed carefully on the toast, and served on a clean dish.

It is here that the common sense and judgment of the teacher must be relied upon to make the lesson practical and of value and interest to the class of students she is teaching. It is here, however, that many home economics teachers often fail. They do not know the home environment of the girl or the social world in which she lives. Antagonism toward the teacher and the course she gives results. Criticism is justly made because she is teaching impracticable, extravagant methods, teaching a waste instead of economy of time and money. The teacher may fail, too, in not recognizing certain fixed customs of preparing and serving foods peculiar to that community or section of the country. It is her duty to teach the facts and principles of cookery, but her knowledge of the homes of the pupils, and their community life must determine to a large extent her choice of illustrative material and laboratory methods.

In many cases reforms in these fixed customs are needed. Here the high school teacher, if tactful and patient, may accomplish an immense amount of good along this very line. The pupil learns how to set a table properly at school. She begs to do this at home, and the mother and whole family are pleased with the results. This "second-hand" reforming process will extend to other duties in the home, and to many homes as well in the community. This will influence the social life and uplift the general standard. No other teacher can be so much of a practical missionary as the home economics teacher if she tactfully adjusts subject matter to the girl and her environment.

THE SUBJECT MATTER FROM THE STANDPOINT OF THE SCHOOL

The subject matter in a course in home economics must be chosen with regard to (1) its relation to allied subjects, especially the sciences; (2) the place of the course in the fixed high school curriculum; (3) the amount of time needed for the course.

The chief value of a laboratory course in foods, from the standpoint of its relation to other subjects, lies in the fact that it is a vastly practical field for the direct application of facts taught in these other subjects; it is a supplement to the courses in biology, physiology and hygiene, chemistry, physics, art, and indirectly to English, mathematics, and economics. By means of this correlation facts become fixed, and made of practical use, assuming importance to the girl which, otherwise, would remain unused and worthless. Too often, however, the home economics teacher does not know what subject matter is being presented in these allied courses and, therefore, fails to make use of them. She should make it her duty to trace these courses every day as they are taught and never fail to apply in her own courses every fact taught in these. The quick response and interest shown by her pupils when this is done will be her daily reward and the pupils' permanent asset in knowledge.

To illustrate this correlation with other subjects, take a lesson introducing protein cookery, the material used for teaching this—the poaching of an egg. What facts are made use of, what past experiences related to the subject can be recalled? What is the boiling point of water? How tell when the water is boiling? What effect has the addition of salt on the boiling point? Why? Why add a drop or two of acid to the water in poaching? How tell whether the egg is fresh or not? What physical tests can be made for freshness? What bacteriological tests? Why does an egg spoil? How can it be preserved? Why? What harmless chemicals can be used in preserving? What temperature should be used in poaching? Should the same temperature be used thruout the process? What is the effect of a boiling temperature on protein? Of a temperature below boiling? Which is more digestible, a hard or soft cooked egg? Why? Why not serve an egg first in a meal, as an appetizer like soup? What does heating do to an egg? Why is a beaten egg more digestable than one unbeaten? Why are potatoes or bread served with egg? Why do results vary so greatly in cooking eggs in the shell? Is poaching an economical method of cooking? When are eggs more economical than meat? How do eggs compare with meat

in the amount of heat and energy given? Calculate the food value of a pound of each. Is there any scientific reason for garnishing an egg in serving? Explain biologically why iron is found in such a large proportion in eggs and in such a desirable form. Can the food of the hen affect the composition of the egg? How does egg form an emulsion with fats? Thus, an infinite amount of related facts might be presented applying laws of chemistry, physics, biology, and economics.

THE GIRL'S COURSE IN HOME ECONOMICS

The course in *foods* had best follow the courses in *science* and may be well placed in the third year when the applications of all the sciences can be made.

Sufficient time must be allowed the subject to give the training it is capable of. It would be unreasonable to assume that home economics could accomplish its aim in less time than courses in English, mathematics, or Latin. The division of this amount of time, usually equivalent to one forty or fifty minute period a day, must be arranged satisfactorily to allow for laboratory practice and also a lecture and recitation period.

The three important factors to consider in choosing a high school course in *foods* have been discussed; the *pupil,* the *environment,* and the *school.* With the general and specific aims of such a course clearly before her, it remains for the teacher to select and arrange definite *subject matter* for such a course.

WE ARE LEARNING THAT WORK AND INDUSTRY ARE NOT INCONSISTENT WITH CULTURE, BUT THAT THEY ARE A NECESSARY PART OF IT. CULTURED ARTISANS AS WELL AS CULTURED ARTISTS CONSTITUTE A PART OF THIS NEW AGE OF PROGRESS.
—William A. McKeever

AN ANTWERP CHAIR

Charles A. Bennett

ON board the steamship Finland, bound for Antwerp, I fell in with a native Belgian who had made his reputation as an electrical expert in the Northwest and was on his way home to claim a bride and take her to America. A few hours before reaching Antwerp, as we were enjoying a delightful morning on the river Scheldt, he asked me where I was going to stop in Antwerp. I told him that I had not fully decided. Then he said that if I wanted to go to a real

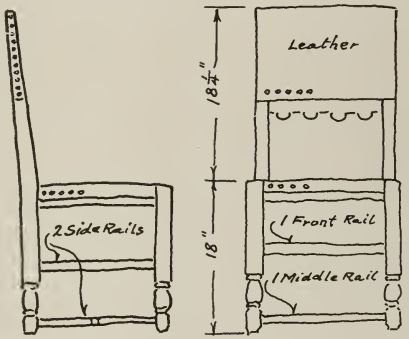


Fig. 1. Sketch of Chair

Belgian hotel—not one fixed up for American tourists—I would do well to go to the *Hotel du Grand Laboureur,* a small moderate-priced place with good rooms and an excellent cuisine. So I went to the *Hotel du Grand Laboureur.*

On being shown to my room, one of the first objects that attracted my attention was a chair constituting a part of the furnishing of the room. And the more I looked at it the more pleased I was with it. It seemed to me one of the most satisfactory chairs I had ever seen. I liked the spacing of the rails, the simple spool design of turning on the legs, the upholstery, and the color, which was a rich dark brown.

Tho the room was cold and my fingers stiff (it was on the 26th of December, 1908), I pulled out my notebook and made the sketch, a

copy from which is shown in Fig. 1. I examined all parts of the chair so carefully that I thought, with the sketch to refresh my memory, I could reproduce the chair pretty faithfully.

This sketch remained in my notebook until last fall when I turned it over to Edward Anderson, a member of the senior class at Bradley Institute, with the suggestion that he make a complete working drawing

FIG. 2. TWO VIEWS OF THE CHAIR

of the chair, and then make the chair in the factory shop. This seemed an appropriate problem for him because he was specializing in art-craft work. The chair was completed as shown in the two views of Fig. 2, all parts, including mortising, turning, carving, finishing, and upholstering being done by Mr. Anderson. The wood used was black walnut, and the back and seat were covered with Spanish leather, golden brown in color. By this time the chair had attracted much attention among the students, and Mr. Anderson had concluded that he would like to make six more chairs just like it for a dining room. This was an excellent problem for him at that time, for he needed to gain more facility in the use of the machines.

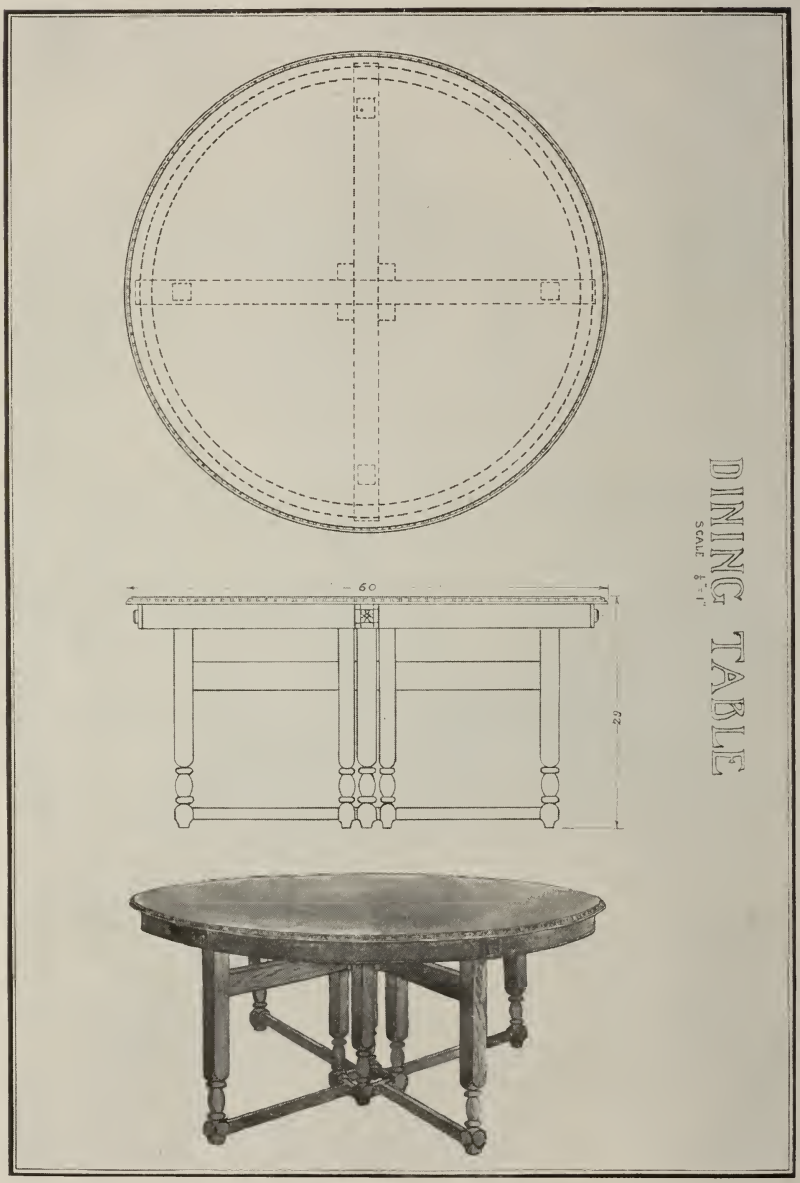


FIG. 3. DRAWING OF TABLE TO MATCH THE CHAIR

FIG. 4. FRAMING THE TABLE

FIG. 5. SHOWING CIRCULAR RAIL BUILT UP OF SEGMENTS

A TABLE TO MATCH THE CHAIRS

The winter quarter had begun and Mr. Anderson was a member of the class in woodwork design. It was suggested that he design a table to go with his chairs. This proved to be an exceedingly interesting tho rather difficult problem. It was first decided that the table should have a round top, sixty inches in diameter, and that its height should

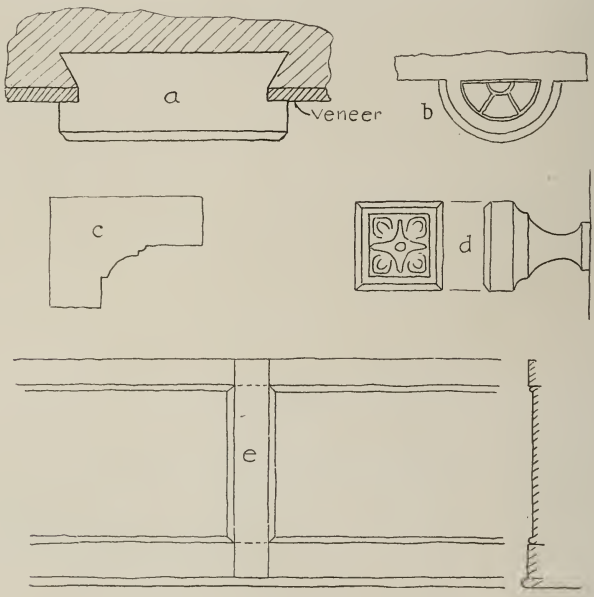


FIG. 6

be 29 inches. The chair design would seem to call for a table with legs and a very low rail instead of a pedestal. But then the table was so large that something seemed to be needed in the middle below to give appearance of greater stability. After making many sketches and discarding all of them, an extension table with two legs underneath the middle suggested the cluster of four legs which Mr. Anderson adopted. So the drawing appeared as in Fig. 3. But when it came to making the table it was decided that the rails from the large outer legs were not properly joined to the cluster of legs, and so the cluster was turned

thru an angle of 45 degrees, allowing the main rails to be mortised into legs at both of their ends. This and the general method of framing and pinning are shown in Fig. 4. Fig. 5 shows the circular rail built up of segment of pine. The outer surface of this rail was covered with an eighth-inch veneer made by resawing a board. Instead of using clamps

FIG. 7. DETAIL OF CARVING ON TABLE

to fasten this on, a plank was sawn out on the arc of a circle to fit one quarter of this rail. Then the veneer was held between the form thus made and the circular rail with clamps. The ends of the veneer passed under the blocks which were placed opposite the four outer legs. These blocks were held in place by being dovetailed into the circular rail, as shown in the diagram, Fig. 6*a*. A detail of the carving on one of these blocks, also the molded and carved edge of the table top, and the thin molding at the bottom of the circular rail, are shown in Fig. 7.

A SERVING TABLE

Before the work on the table had gone very far Mr. Anderson had proposed to make a serving table, and so complete the furniture for a room. A design was presented. The chairs and the table were being

made in the factory shop; the serving table was to be made in the manual training shop. So it was that the serving table was all handwork. Even the molding around the edge of the top, which in the table was made on the shaper, in the serving table was made by filing a scraper to the right curve, *c* Fig. 6, and working the molding by hand. The knobs, *d*, Fig. 6, were carved out of a solid block.

Fig. 8. Detail of Carving Serving Table

From beginning to end in these problems esthetic considerations were given equal consideration with structural. For example, a study was made of the comparative sizes of chair legs, table legs, cluster legs, and outer table legs. The height of the independent rail below the drawers on the serving table was determined after considerable experimentation—moving it up and down on the drawing. The back piece on the top of the serving table was studied in the drawing for angle and placing of notches, and on an experimental piece of wood to determine the molding of its edge and front surface. At first it was thought desirable to place another square of carving, Fig. 8, opposite the rail below the oblong on the leg of the serving table, but upon further study that was abandoned. The drawer was set in deep and a bead put around its edge, after the manner of some fine old historic pieces, in order to strengthen the line of the drawer, thus producing the effect of a panel.

Perhaps the most interesting of all these little side studies was caused by a mistake. The stile between the drawers in the front of the serving table was saddled over the rail at the bottom of the drawer, Fig. 6*e*. This gave sufficient strength, but it looked very weak. It was soon discovered, however, that this effect of weakness was almost entirely lost when a thin piece was placed below it. Moreover, when

this thin piece was rounded it became a molding quite in harmony with the molding on the lower edge of the circular rail of the table, and really added to its attractiveness.

Other esthetic as well as many structural problems involved in the making of this dining-room set might be mentioned, but the chief pur-

FIG. 9. CHAIRS, TABLE AND SERVING TABLE COMPLETE

pose in presenting this account at this time is to indicate that for students who are qualified to undertake such work, an excellent problem is to design one or more pieces of furniture to harmonize with another. This forces upon the student an analytical study of the given piece, and sets for him limitations which are essentially those which constitute what is called style. The problem may be made still more valuable if, in selecting the piece, care is taken that it have marked characteristics combined with fine quality of design. In the case of the Antwerp chair it is safe to say that the problem was worked out with, "something of the feeling of pride and ambition in his craft, which, in the old days of the Trade Gilds, animated our Jacobean joiner,"[1] and furthermore, that it was a valuable means of emphasizing some of the refinements of design not always considered in school shops.

[1]Frederick Litchfield: Illustrated History of Furniture; p. 241

SIMPLIFIED JEWELRY WORK[1]

ARTHUR F. PAYNE

IN the development of the manual arts during the past twenty years, we find a constant shifting of aims, methods, and mediums, and the process of adapting and eliminating is still going on. This is as it should be. Manual training is the newest subject in the school curriculum, and in its development may soon become the most vital to the student and to society. However that may be, it is certainly too new a subject to allow of its becoming stagnant and stulified with dogmatic tradition in either aims, methods, or mediums.

FIG. 1. SILVER RINGS OF SILVER WIRE

Many influences have contributed to this constant change and growth in the manual arts, one of the most prominent of which is the arts and crafts movement. To this movement manual training owes a very large debt; it has given to manual training the mediums of pottery, leather work, stencilling, basketry, rug weaving, art metalwork, and jewelry.

It is not the object of this series to advocate the adoption of hand wrought jewelry into every course, as no new medium should be introduced into any school without a careful analysis being made of the medium, with its advantages and disadvantages, its aims and special values, and consideration of its fitness for that particular type of school and student. This series will give to those teachers who have analyized the needs of their community, school, and students a method of teaching this most interesting subject, in which the tools and processes have been organized in logical order, and interesting problems designed that bring into use the various tools and processes in their proper order.

[1]Copyright, 1914, by Arthur F. Payne

FIG. 2. JEWELER'S TOOLS: ROUND NOSE PLIERS, FILE, SHEARS, FILE, TWEEZERS, FLAT PLIERS

FIG. 3. ASBESTOS BLOCK, CHARCOAL BLOCK AND FOUR TYPES OF LAMP SUITABLE FOR USE IN SOLDERING JEWELRY: (1) BABY TORCH; (2) CLAYTON AND LAMBERT ALCOHOL TORCH; (3) ALCOHOL LAMP WITH BLOWPIPE; (4) BUNSEN BURNER

FINGER RINGS OF SILVER WIRE

The first problem should, of course, be of the simplest kind. The finger ring of silver wire made of three rings soldered together, Fig. 1*a*, has been chosen as the first problem because it brings into use some of the most fundamental tools and processes in the simplest manner, and the results may be readily checked up by the student and teacher. The tools needed are shown in Figs. 2 and 3. The principal tool is the lamp or torch used for soldering. Four types are shown, Fig. 3, any one of which is satisfactory, altho the alcohol lamp and blowpipe are perhaps the most commonly used for small work. The other tools needed are the charcoal or asbestos soldering block, shears, files, tweezers, round and flat-nose pliers, small hammer, and polishing sticks.

The materials needed for this problem are sterling silver wire, gage 15 (Brown & Sharpe gage), easy flowing silver solder, soft iron binding wire, gage 20, borax, fine emery cloth, rouge, tripoli, and jewelers pickling acid. The use of these tools and materials will be explained in their order.

The first step in ring making is to obtain the size of the ring, which can be done easily by measuring the circumference of the finger with a narrow strip of paper. With the shears cut off three pieces of silver wire $\frac{1}{16}''$ shorter than the strip of paper; this is usually done when making rings so that they can be stretched up to the exact size. If the silver wire is hard and stiff, "anneal" it; that is, make it soft by heating it to a dull red heat in the flame of the lamp, being very careful not to melt it. File the ends flat and bend each piece of silver wire to a circular form with the round-nose pliers. Be sure that the ends touch and match perfectly. The wires are now ready for soldering.

Silver solder must always be used on silver; under no circumstances should soft solder be used. Powdered borax mixed with water to the consistency of cream is used for the flux. Place the wire ring on the soldering block and place a little of the wet borax paste on the joint. Cut the solder into small pieces about $\frac{1}{16}''$ square. This may be done readily by cutting the solder in strips, and then cutting across the strips, as shown in Fig. 4. Pick up one of these small pieces of solder with the tweezers, dip it into the borax, and place it on the joint. Melt the solder so that it flows into the joint by using the lamp flame and blowpipe as shown in Fig. 5. Fig. 5 also shows the mandrel and a spool of iron binding wire.

A little difficulty may be experienced at first in keeping a steady

stream of air passing out of the blowpipe, but it is a knack that is soon acquired after a little practice. Care must be taken to get both sides of the joint equally hot, as the solder invariably flows toward the hottest point. Such a small piece of silver wire also melts rather easily, so the student should not be discouraged if he melts the first one; in fact, it is a good scheme to take a small scrap of the wire and find out by trial just how much heat may be applied before it melts.

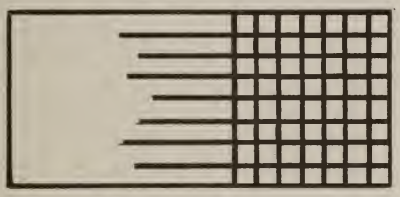


FIG. 4

When the joints of the three rings are soldered, place them for ten minutes in the "pickle," which is made of two parts water and one part of sulphuric acid; this will remove the melted borax and clean the silver. Always pour the acid into the water when mixing the pickle, as it will spatter if the water is poured into the acid. This pickle will not injure the hands if washed off immediately in cold water, but it will eat holes into any cloth it comes into contact with.

SHAPING THE RING

The next step is to get the rings perfectly flat and round, and stretched to the right size. This may be done on the "ring mandrel" which is a round tapered piece of iron or steel about 12″ long, 1″ in diameter at one end, and tapering to ⅜″ at the other end. By slipping the rings on the mandrel and carefully driving them down towards the large end they may be stretched to the same size and at the same time made perfectly round.

Now the three rings must be soldered together. The first step is to clean the surfaces that are soldered together. This is done by laying the rings on the emery cloth and rubbing lightly. Do this on both sides of the middle ring, but only on one side of the two outside rings. Place the three rings in position, one on top of the other, and bind them together with the fine iron binding wire; this may be done by threading the wire thru the rings, pulling tight, and twisting the ends. Put borax paste on the rings where the solder is to flow, place small

pieces of solder inside the ring, and hold it in the flame of the alcohol lamp with the tweezers. The solder will be placed, of course, only on the bottom of the ring, but it will flow part way up the sides; the ring may then be turned and more solder placed in position. Care must be taken not to get so much solder on that the crevices between the wires get filled up, also not to get too much heat on the joints of the rings as they are liable to melt apart.

FIG. 5. SOLDERING ONE OF THE RINGS, SHOWING SPOOL OF IRON WIRE AND MANDREL

Place the ring in the pickle again, and when it is clean file off any rough spots, polish first with the fine emery cloth, and then with the polishing sticks. These sticks are merely pieces of wood 10″ long, 1″ wide, and ¼″ thick, with felt glued on one side. Two of these sticks will be needed, one for "tripoli" another for "rouge." Tripoli is fine sand made into a cake with wax and oil. Rub a little of the tripoli on one of the polishing sticks, and polish the ring briskly with it. When all of the scratches are polished out, wipe off all the tripoli, as none of it should be allowed to get on the rouge stick. Rub the cake of rouge on the second stick, and polish the ring again. This will make the ring bright and shiny, and after washing the ring it is ready to wear. All of the polishing materials may be obtained from any jewelry supply house. Sterling silver and gold in any form, also gold and silver solder can be obtained from the following firms: Handy and Harman, 22 Pine

St., New York, N. Y.; Thomas J. Dee and Co., 5 South Wabash Ave., Chicago, Ill.; Goldsmith Bros., Heyworth Bldg., Chicago, Ill.; John J. Jackson Co., Newark, New Jersey.

FIG. 7. PLAIN AND TWISTED WIRE RINGS

FINISHING

The antique silver finish may be given to any piece of jewelry by dipping the pieces after it has been polished into a solution of potassium sulphide. This solution is made by dissolving a piece of the sulphide about ½″ square in ½ pint of water. The solution must be kept tightly corked as it deteriorates on exposure to the air. The silver will be turned dark brown or black by the sulphide solution. Rub the color off the high spots with a soft cloth and polish lightly with the rouge stick.

There are many variations of this wire ring problem. The "knot" ring is the most popular. Fig. 1*b*, and Fig. 6*a*, illustrates this type of ring. The method is as follows: Two pieces of wire are cut, and in the middle of one an ordinary knot is tied and pulled tight with the pliers. The other straight piece of wire is slipped thru the knot, and a knot is then tied in that. The loose ends are cleaned and bound together by winding iron wire around them and soldering them together. Then cut off to the required length, bend around the mandrel, and solder the ends together; clean the ring in the pickle, file, and polish, An interesting modification of the knot ring is shown in Fig. 6*b*. It is made in the manner described, except that instead of using a single plain wire two wires are twisted together and the knots are tied in them and they are treated as tho they were a single wire.

The ring shown in Fig. 1*c*, is made by bending two wires in the form of a hair pin, slipping the ends of each thru the loop of the other, pulling tight, and soldering and finishing in the same way as the other rings.

Other variations are shown in Figs. 7 and 8. No. 1 is made with a large wire in the center, and two smaller wires on each side. No. 2 is made of three wires the same size. Two are soldered together first, and then the third wire is fitted and soldered in the middle. No. 3 is practically the same as No. 2, using different sizes of wire. No. 4 is made of one long piece of wire wound around the mandrel, annealed, and bound together with the iron wire, and soldered together; then the ends are bent around the ring and soldered in place, the wire being filed away entirely on the inside so that the ring will be kept smooth.

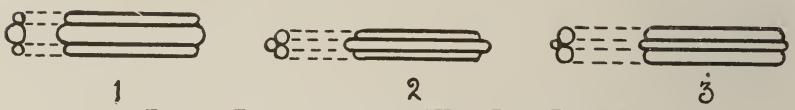


FIG. 9. EXAMPLES OF THE WIRE RING PROBLEM

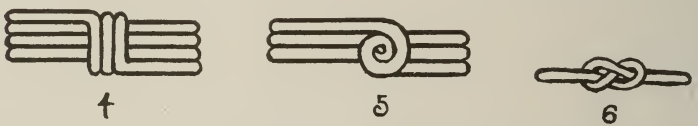


FIG. 8. EXAMPLES OF THE WIRE RING PROBLEM

No. 5 is made in a similar manner, except that one end is bent into a spiral with the round nose pliers, and soldered on the front of the ring, the other end being underneath the spiral. No. 6 is a single piece of wire bent in the form of a knot, then bent around the mandrel, cut to size, and the ends soldered together.

Any of these rings may be made of solid gold if desired, as the process of making would be the same, except that gold solder would be used. If the ring is to be made of 14 karat gold, 8 karat solder should be used.

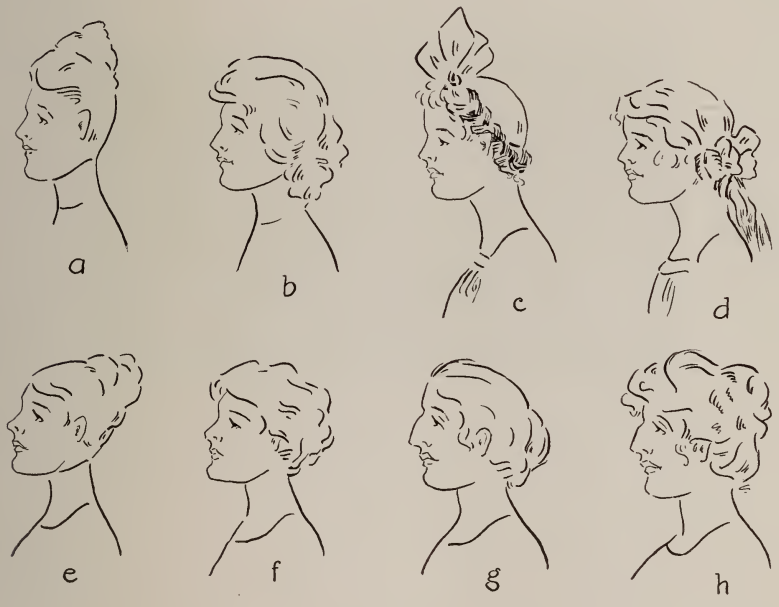
This does not by any means exhaust the possibilities of the ring problem, but this series of articles is based upon a logical analysis of tools and processes, arranged in sequence of increasing difficulty and complexity, rather than upon a sequence of problems.

The simple variations suggested show the possibilities of the material, and also the possibilities of the work as a means of self-expression and development of individuality, and of creative and inventive thought, in addition to its direct vocational value, and these are vital factors that it behooves the advocates of the manual arts to foster and encourage in all branches of the work.

PRINCIPLES OF DESIGN APPLIED TO HAIR DRESSING

LYDIA BOLMAR AND KATHLEEN MCNUTT

IF our faces were all built on the perfect lines of the features of a Greek goddess, we might follow the freaks and fancies of fashion with little or no fear, but unfortunately we are not all so constructed. A face, already bad in line, often has its defects greatly magnified by a thoughtless repetition of these lines in the dressing of the hair. For we must remember that a bad line, let it be found



where it may, is always made worse by being repeated; whereas, by avoiding or neutralizing these lines and giving proper emphasis to the good ones, we may do much to cure the defect.

The head marked *a* in the accompanying illustration, is already too long for its width. This defect is greatly exaggerated by dressing the

hair on top of the head, thus supporting and strengthening the vertical structure. The one marked *b* is exactly the same head as *a*, with the hair arranged to support horizontal structure, thus giving width where it is most needed.

The heads marked *c* and *d* illustrate the same principles as *a* and *b*. The use of the ribbon and loose dressing of the hair, as shown in *d*, are effective in relieving the awkward appearance of the neck. Heads *e* and *f* show how the defect of an over-prominent and severe jaw line or tilted nose may be lessened by the proper arrangement of the hair.

The hair over the forehead should be brought as far forward as the most prominent feature of the face *g*, and *h*, and the coil of the hair will give a more pleasing effect if placed at a point other than opposite the prominent feature.

UNDER THE DIRECTION OF THE TWO CHIEF DESIGNERS FROM THE LENOX POTTERY WORKS, THE STUDENTS OF THE SCHOOL OF INDUSTRIAL ARTS, TRENTON, N. J., PRODUCE POTTERY FROM THE RAW CLAY TO THE FINISHED WARE

INTRODUCTORY PROBLEMS IN ARCHITECTURAL DRAWING, II

GEORGE E. CHANDLER

EVERY teacher of architectural drawing has probably experienced difficulty in getting students to draw moldings neatly and correctly. The moldings shown in this article are intended to help the young draftsman overcome this difficulty. He should refer to them constantly, noteing the shape of the molding and method of drawing them.

When the size of the molding desired differs from that given in the problems, first, determine the size of the molding and sketch in lightly the approximate outline of the molding it most closely resembles, *e, g.,* crown molding, bed molding, etc. With the instruments divide the course into arcs and straight lines, noteing carefully the points of tangency.

Continuing these problems, involving geometric construction, as outlined last month:

Problem IV has to do with two arcs of circles and the drawing of straight lines intersecting or tangent to both of them.

Problem V involves the intersection of two arcs of circles. Note the different methods of locating the required centers when the radius is given.

Problem VI is an assembly drawing covering the elements already given. Where the number of a molding, merely, is given, reference should be made to the preceding figure having the number.

Problem VII is a continuation of the principles used in Problem V.

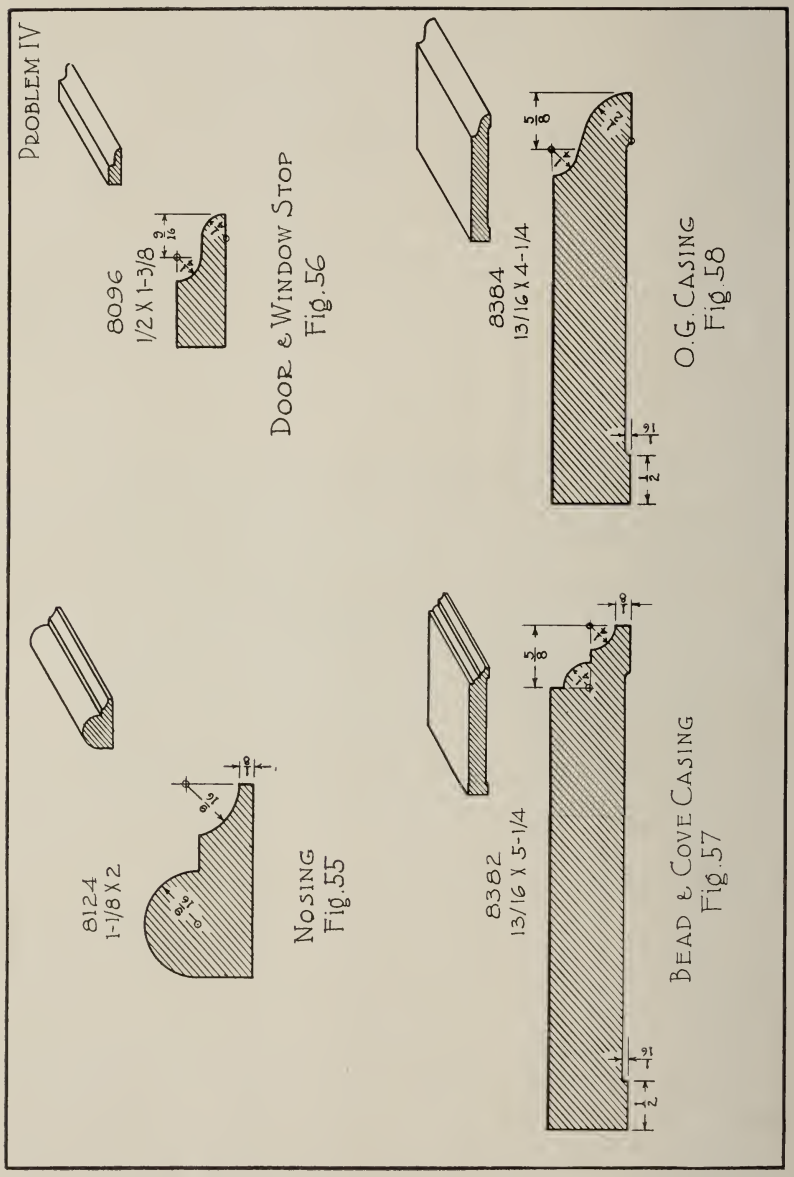
Problem VIII embodies all of the construction thus far learned in the form of an assembly drawing. Note that as the student progresses less of the manner of construction is indicated.

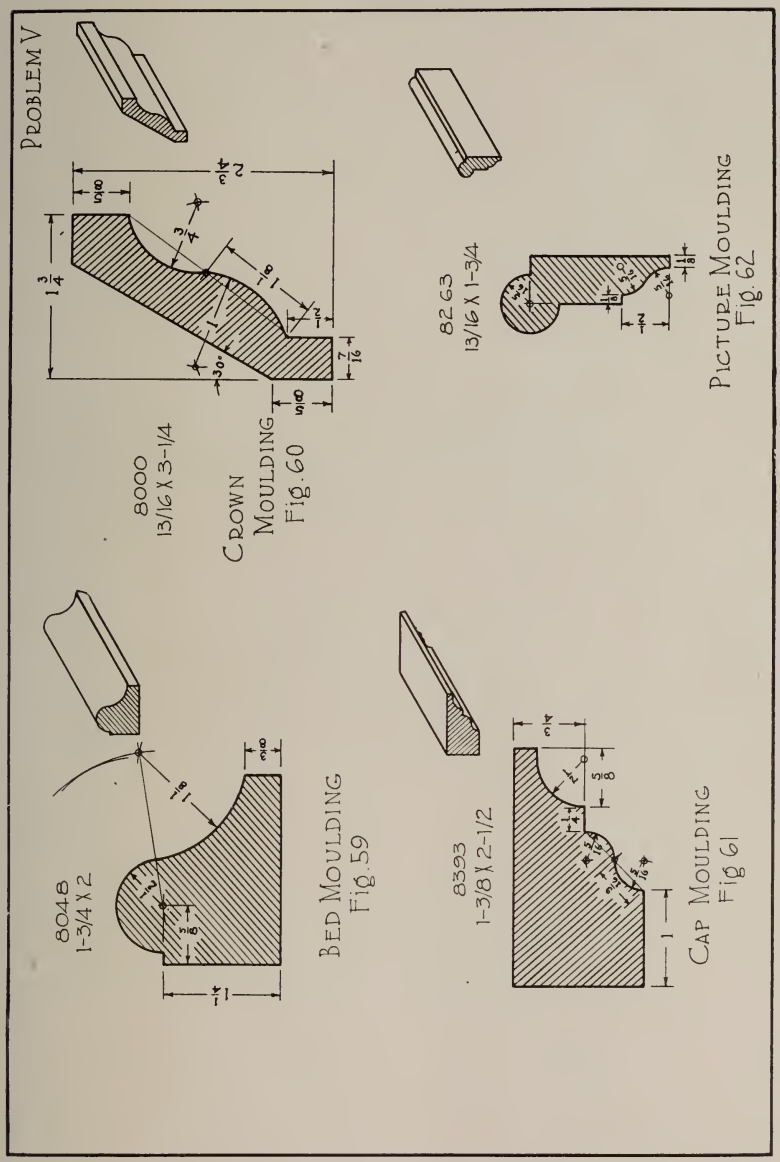
Problem IX is especially intended to make the student think. Only such suggestions as are necessary are given. Begin by blocking in a rectangle the exact size of the overall dimensions. Be sure to leave in all construction lines in pencil.

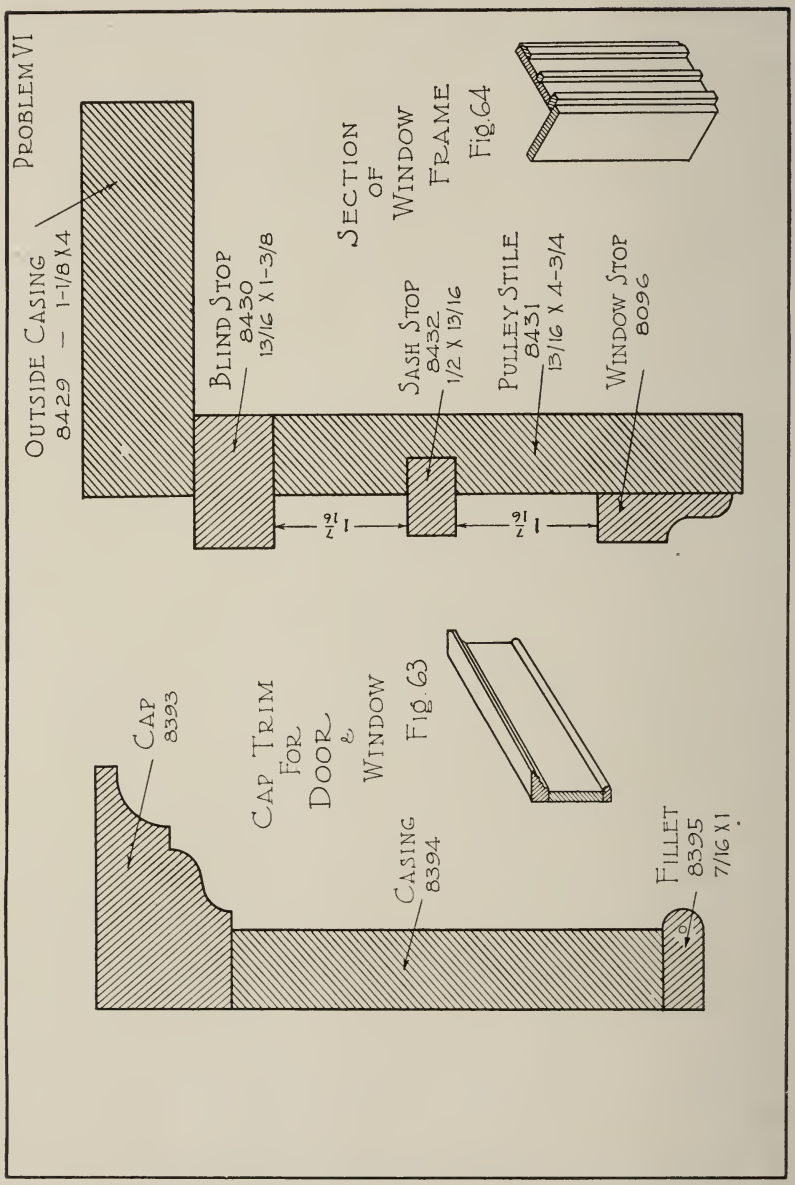
Problem X indicates the method of representing two common kinds of doors. In Fig. 76 distances "*A*" should be equal. Draw to scale 1″=1′0″.

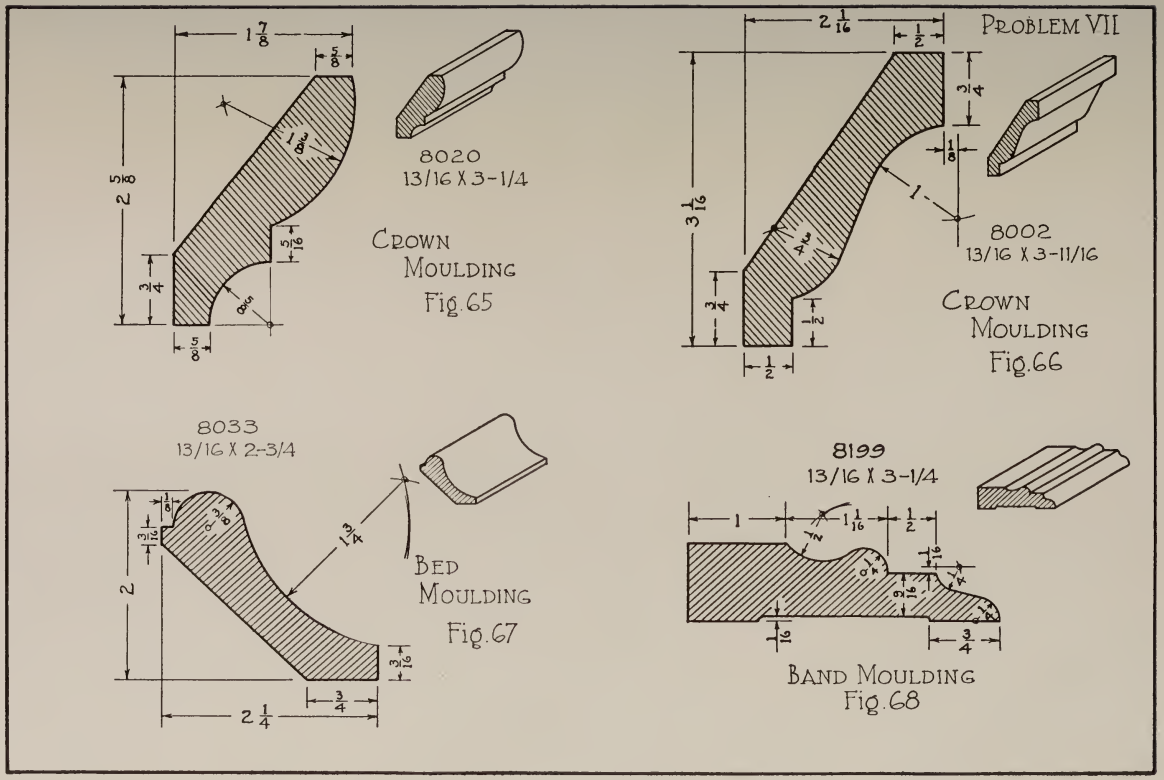
Problem XI shows the details of a double hung window and frame. Draw to scale 1″=1′0″ section *C-D* is enlarged to a scale 2″=1′0″.

Problem XII. Assemble the details in Problem XI showing the window in place in the frame. Place vertically on sheet. Scale 2″=1′0″.


PROBLEM IV
8096
1/2 X 1-3/8
DOOR & WINDOW STOP
Fig. 56
8124
1-1/8 X 2
NOSING
Fig. 55
8384
13/16 X 4-1/4
O.G. CASING
Fig. 58
8382
13/16 X 5-1/4
BEAD & COVE CASING
Fig. 57


PROBLEM V
8000
13/16 X 3-1/4
CROWN
MOULDING
Fig. 60
8263
13/16 X 1-3/4
PICTURE MOULDING
Fig. 62
8048
1-3/4 X 2
BED MOULDING
Fig. 59
8393
1-3/8 X 2-1/2
CAP MOULDING
Fig. 61


PROBLEM VI
OUTSIDE CASING
8429 — 1-1/8 X 4
BLIND STOP
8430
13/16 X 1-3/8
SECTION
OF
WINDOW
FRAME
Fig. 64
SASH STOP
8432
1/2 X 13/16
PULLEY STILE
8431
13/16 X 4-3/4
WINDOW STOP
8096
1 7/16
1 7/16
CAP
8393
CAP TRIM
FOR
DOOR
&
WINDOW
Fig 63
CASING
8394
FILLET
8395
7/16 X 1


PROBLEM VII
8020
13/16 X 3-1/4
CROWN MOULDING
Fig. 65
8002
13/16 X 3-11/16
CROWN MOULDING
Fig. 66
8033
13/16 X 2-3/4
BED MOULDING
Fig. 67
8199
13/16 X 3-1/4
BAND MOULDING
Fig. 68

EDITORIAL

WHETHER or not national aid shall be given to vocational education opens up a large question. The affirmative answer has its precedents in the national grants given to agricultural and mechanic arts colleges and to grants allowed under the Lever Bill. It has its precedent in national appropriations to water ways and other provisions giving aid to states for lines of work which have an inter-state value. It may be that national aid should be allotted to the states for vocational education for the same reasons that various states grant it to local communities for such instruction.

The Question of National Aid for Vocational Education

It is evident that there is a marked tendency everywhere in American education toward an increase in the amount of state aid for education. This help is being applied more and more to encourage and assist local communities to undertake new and necessary kinds of training serviceable to childhood. Grants to aid the local government in the support of vocational instruction are indispensable for the following reasons: first, for an equitable mitigation of the inequalities of burden; second, to secure effective authority for the necessary supervision and control by the state government; third, to encourage the kind of expenditure most desirable in the interest of the state and the community as a whole; fourth, to make it possible to attain anything like a universal enforcement of a minimum which the state has prescribed through standards set up by state educational authorities for promoting and maintaining the education of industrial workers, which is absolutely essential to the industrial supremacy of a state; fifth, to pay the just share of the state in a kind of education which must always, comparatively speaking, be expensive and of state-wide benefit.

Some of the states will say that they need national aid, leaving it to the wealthier states to pay the bill. Some of the larger and more prosperous states can hardly say that they actually need national grants in order to prepare teachers for vocational education or to pay a portion of the cost of vocational instruction. No state will refuse the money. Naturally they will make good use of any appropriations made by the government. Obviously there is at least one justification for the seeking of national aid, it offers a means of evening things up. That is what is practically implied in the five principles enumerated in the previous paragraph.

One is constrained to express his own feeling that there is involved a larger question than that which relates directly to the grant of national aid for training teachers or for vocational education; a larger question than that of the immediate vocational needs of the several states or the possible use to which Federal moneys would be put. That larger basic question is as to what the Nation's general policy should be with respect to education as a whole. This question is raised not in disparagement of any such grant as is proposed, but rather to call attention to what such specific help imports and may eventually involve; namely, national aid of education in general, with a control over such education commensurate with the aid, for certainly if the Federal government is to give, it should also in like measure control.

Sympathetic as one should be toward the encouragement in every possible way of that training which will enable our children to prepare for and find their most helpful places in our economic life, one may not yet be clear in his own mind that the Federal government can find basis for exclusive aid of this sort of training. Nor may he be able as yet to make clear to himself the theoretical basis for encouraging one type of educational training as against another. Yet one should be, it would seem, strongly of the opinion that if this aid is given by the Federal government, it should be given in such a way as not to weaken the sense of local or state responsibility. —ARTHUR D. DEAN

Danger in Short Unit Courses

Like a great many other good things a short unit course may sometimes be undesirable, and we question whether this will not prove to be the case in most vocational day schools, and certainly in prevocational or elementary industrial schools.

The short unit course is undoubtedly a force to pull students from the industries into evening and special trade schools. We know of evening schools that have increased their attendance very largely since offering six or eight week courses (12 or 16 lessons) in small subdivisions of subjects or in subjects that are highly specialized in character. We also know of trade schools that find the short unit plan almost equally effective in increasing their enrollment.

But the short unit course is not only a force to pull students into school; it is also a force to pull them out. As soon as a boy realizes that he has learned something that will enable him to earn wages that seem attractive to him he is tempted to leave school and go to work. And it may be that this temptation will take him away before he ought to go. Even if he were prevented by law from doing this, we still doubt

the wisdom of offering short unit courses, with emphasis on the immediate money value of the training, to boys who are in day schools. If short unit courses are to be given in such schools they should be in sequence, leading up to a higher end than a job that is likely to still leave the worker in a blind-alley occupation. Let us realize that the short unit courses may pull students either in or out of school, and be sure to use it only where there is little or no danger of its becoming a temptation to go in the wrong direction.

Cooperation With a Museum

One of our unexpressed hopes is coming to be a reality. We have long felt there should be a closer cooperation between the public museums and the public high schools. From the viewpoint of public service, taken by the progressive museum, and that of richer educational opportunities, taken by enlightened school boards, as well as that of instruction by specialists, taken by parents and pupils, there seems to be every reason why high schools should give credit for approved courses offered by museums and art schools, and should encourage pupils to attend such courses if their proper tendencies are in that direction. Such cooperation would increase the popularity of both the high school and the museum or art school; it would broaden and elevate the instruction given at public expense in the most economical possible way. In fact the plan seems so feasible that we wonder that it has not been given more attention in the past. Perhaps this is because the public museum is only just beginning to get anything like due recognition in this country, and has therefore been too handicapped to adopt a broad educational policy. But that time is rapidly passing. The museum of the future will be an institution of such recognized value that even the smaller cities will possess them, and public funds, as in the case of Detroit, will be appropriated to build structures for their use. The day ought to come soon when manufacturer and distributor, employer, and workman, rich voter as well as poor will demand an opportunity to receive the educational benefits of a well organized museum, and that it shall be run in cooperation with the public schools.

We are therefore pleased to notice that a working plan of cooperation has just been perfected between the Museum of Fine Arts and the public high schools of Boston. Superintendent Dyer is authorized by the Boston School Committee to expend $225 in this cooperative work during the coming year and to approve courses allowing five points toward graduation from a high school. It is hoped that this is the beginning of another valuable educational movement which will spread

to other cities and will ultimately include properly accredited courses in music as well as art. For several years, beginning under the superintendency of Dr. Dyer, the Woodward High School of Cincinnati, has made use of this principle of cooperation and credit with good results. There is many a girl and not a few boys whose parents would rejoice if such possibilities for high school credits in art and music were open to them. Moreover, many high school girls are now breaking down in health because they are overloaded with a high school program that they are forced to take and an art or music program that they want to take. Often the sacrifice is in health which is more important than either. A high school course combining these two programs in reasonable proportion would be far more rational than the present practice. We shall look for interesting results in this direction.

Death of Mr Greenwood

In common with hundreds of other schoolmen we feel a personal loss in the death of James M. Greenwood, for forty years superintendent of schools in Kansas City, Missouri. His death came very suddenly on the morning of August 1st. He reached his office as usual about 8 o'clock, sat down at his desk and began opening the mail. A little later he seemed to be taking a quiet nap when a friend came in and laid his hand on his shoulder. To his surprise Mr. Greenwood did not turn his head with the usual smile and cheerful greeting. Unknown even to those who were near him, the end of the long and active life had come thus peacefully.

Our personal acquaintance with Mr. Greenwood began a few years ago on a Santa Fe train coming east from California. In three days one can sometimes get to know a man pretty well. He told of pioneer days in Missouri, of his Civil War experience, and numerous incidents connected with educators of note and educational events that have become historic. His fund of facts concerning the educational history of the Central and Western states was remarkable, and his reminiscences were delightful. Mr. Greenwood was a great reader, a prolific writer, a forceful speaker, and always awake to the new problems of school work. Tho he was born in Illinois and never held a school position outside of the state of Missouri, he and his work became so well known that the whole country recognizes its loss in his departure.

—Charles A. Bennett

OF CURRENT INTEREST

ADAPTING SHOPWORK TO COMMUNITY NEEDS

WE have recently learned of a suggestive experiment in manual training methods which was carried on last year at Stephen, Minn., a town of about 1,000 population, up in the Red River Valley. The teacher of manual training, J. H. Service, was a graduate of the Rose Polytechnic Institute with a year or more of practical shop experience, but without experience in teaching. He was, however, working under a progressive superintendent of schools. The following report written by Mr. Service shows what can be done by a teacher with personal force and enthusiasm where time enough is found for shopwork—even tho it be evening time, as in this case. It also shows what technical knowledge and organizing ability, combined with the individual method of teaching, can do for shopwork instruction in a small community.

At the beginning of the year the boys were told that each would be permitted to construct any article that he or his parents wanted, and that these articles might be constructed in any design and finish that he or his parents wanted, subject only to the following restrictions: (1) that the boy must buy this material himself and bring it to the schoolhouse before beginning construction; (2) that the work must be passed upon at each step by the instructor, as to right principles of construction and quality of workmanship; (3) that every article must be a useful article.

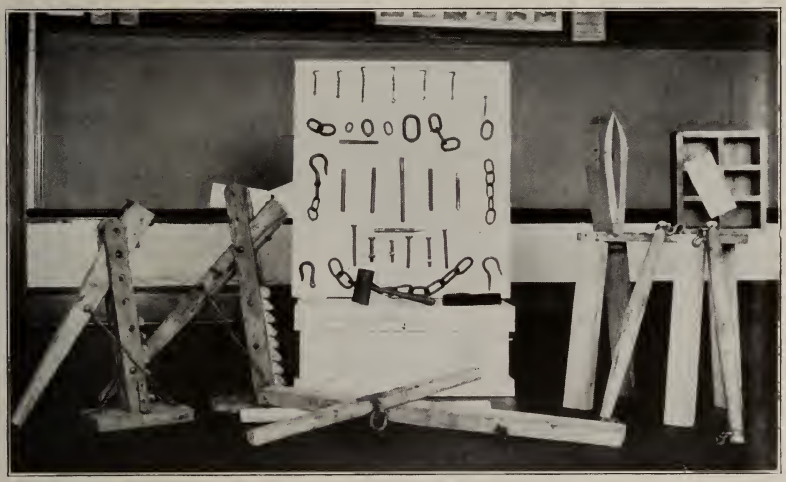
Until they should decide what articles they wished to construct for themselves or their parents in this way, the boys were set to work making butterfly boards and nets for zoology, window plant boxes for agriculture and knife-and-fork boxes for domestic science; and during the course of the year a considerable amount of work was done in this way for the school by boys temporarily out of work of their own. As they began to decide upon work for themselves, the making of furniture was at first discouraged (but not prohibited) in order to overcome in our school the too prevalent tendency of manual training toward the production of exclusively domestic articles. When once a few boys had begun work on such articles as step-ladders, wagon jacks, etc., there was no great difficulty in obtaining the desired variety of product.

In the matter of order and dicipline, it was the purpose to maintain rather the atmsophere of a well regulated workshop than the atmosphere of a schoolroom. The boys were allowed to whistle and sing at their work and even good naturedly to chaff one another when careless work was done.

The teacher was always at hand to help the boys in planning their work and in overcoming unusual difficulties of construction, but they were required

to solve their own problems so far as was consistent with economy of material, good quality of workmanship and correct practice in the use of tools.

Some lecture-recitation work was given in the varieties, growth, structure and properties of timber, in the names, uses and care of tools, and in the manufacture and properties if iron and steel. The shopwork included both woodworking and blacksmithing.



The results of the experiment have shown that the above outlined method has in our school accomplished the following very desirable effects: (1) an enthusiasm that insures whole-souled, honest industry and reasonably good order and discipline; and (2) strong, well-made, useful products from every boy, products that will efficiently serve purposes, however small, in the work and recreations of the community. As an illustration of the enthusiasm it may be mentioned that many of the boys were always glad of permission to work in the shop in the evening and on Saturday; and the shop being kept open for at least two evenings a week and nearly every Saturday, the informal classes at these times were usually larger than the regular classes.

Among the things made in Mr. Service's classes during the year were the following: harness repairing horse, sixteen foot hay rack, wagon jacks, wagon trees, garden marker, saw-horse, tool chest, work-bench, drawing desk, blueprinting frame, sleds, skees, induction coil for amateur wireless telegraph station, ironing board, sleeve boards, fly trap, step ladders, clothes drying rack, davenport, sewing table, writing desk, music cabinet, medicine chest, bookshelves, electric stand lamp. A few of them are shown in the accompanying illustration.

SECOND FLOOR CORRIDOR

STAIRWAY

FIRST FLOOR CORRIDOR

THREE VIEWS IN THE INDUSTRIAL ARTS BUILDING, GEORGE PEABODY COLLEGE FOR TEACHERS, NASHVILLE, TENNESSEE

SECOND FLOOR ROOM IN HOUSEHOLD ARTS BUILDING, GEORGE PEABODY COLLEGE FOR TEACHERS, NASHVILLE, TENNESSEE

INDUSTRIAL ARTS AT THE GEORGE PEABODY COLLEGE FOR TEACHERS

In the April, 1913, number of the *Manual Training Magazine* we published the floor plans of the Industrial Arts Building of the George Peabody College for Teachers, Nashville, Tenn. We now present to our readers two photographs of corridor and stairway of this same building and a view of one of the second floor rooms in the Home Economics Building. Neither money nor thought has been spared to make these buildings thoroly modern—both practical and beautiful. It is fitting that it should be such, for the College under the impulse of new buildings, new faculty and greatly increased resources is intended "to serve as an educational crown of the systems of schools which the Southern States have established and are maintaining." It already has a notable history, but now it will at once take the place of unquestioned leadership in its special field. Because of these facts it is of interest to notice the large place that it is giving to the practical arts.

The College consists of three divisions, the School of Education, the School of Practical Arts, and the Seaman A. Knapp School of Country Life. The School of Practical Arts consists of two divisions, Industrial Arts and Home Economics. The School of Country Life has for its purpose the training of men and women for leadership in rural communities. The Division of Industrial Arts offers training for special teachers of (a) woodworking, (b) metalworking, (c) printing, (d) drawing, and (e) supervisors of handwork in the elementary school. The courses are so arranged that two years of work lead to a certificate, but it is hoped that a large proportion of the students receiving such certificates will return for two more years and complete the work for the B. S. degree. Each student is expected to choose a major line of work, as woodworking or metalworking or printing, and pursue it thruout his course. In addition to this he must select a minor subject which is allied to his major subject. During the first year he takes 12 hours work in his major subject, 6 in elementary drawing and design, 9 in mechanical drawing, 8 in composition and literature and 12 elective. In the first year the largest proportion of time is given to Industrial Arts and the amount grows less as the course continues. This arrangement takes into consideration present and future demands in the field as well as the presentation of the subject matter with reference to the developing power of the individual students.

THE WHITE ELEPHANT

We have *The White Elephant* on our hands. It is not a burden, however, but a small monthly magazine "from the land of the white elephant," Siam. It is devoted to educational interests. With its oriental emblems and Siamese characters (the major part, however, is printed in English) it suggests a far away dream world. But it seems from a very real world when one reads about the schools and their struggle to adopt manual training in opposition to the idea of the natives, that to work with the hands is a disgrace. *The White Elephant* itself is one of the means of introducing industrial training, for all the type setting, printing and proof reading is done by the senior class of the college in which it is published. For fifty years most of the schools have trained the girls in sewing, but the boys have had no hand work whatsoever. Two years ago manual training for boys was adopted by many of the missionary and government schools. To give incentive to this movement

an exhibit of the work from all these is to be held annually. At the first one, held last October, we read of His Majesty the King of Siam walking thru eight schoolrooms filled with the children's work. His surprise and interest can easily be imagined as he looked at working models of steam launches and Siamese boats, clay models of native houses, real fishing nets, and traps, hats, mats and baskets and even leather shoes. The girls were not forgotten, they had a display of laces and fancy work. Many of the things exhibited were for sale.

WANTS TO MAKE THE SCHOOL SELF-SUPPORTING

Self support as soon as possible, is one of the aims of the Boardman Apprentice Shop, a New Haven vocational school. Altho the school started last year the sale of furniture made there averaged two hundred dollars a month. But perhaps the most distinctive feature is the large amount saved by the boys working on other school buildings, as well as their own. That this amount was a large one can be seen from the following details:

I. In the printing department there were printed:
4,000 High School graduation programs.
6,000 Courses of Study.
1,500 Freshman Handbooks (each book of 76 pages.)
5,000 High School Text-books.
5,000 Grammar School Text-books.
80,000 Cooking Recipes.
20,000 Principals' Requistion Books.

II. The apprentices of the painting department finished the walls and ceilings of fifteen rooms, covering 30,000 square feet of surface and applying 1,850 running feet of stencil work of their own design, preparing all walls, rigging, stagings, etc. They also painted some of the rooms at the Boardman, besides minor work.

III. The members of the plumbing department established laboratories for nurses in six schools, four new sinks in the Welch school, 800 feet of steam coil in the Boardman, and practically all repair work in all the schools.

IV. The machinist department manufactured four ten-inch speed lathes, beside general repair work and the making of tools.

V. Practically all the electrical work for the public schools last year was done by the apprentices of Boardman shop.

BULLETINS TO HELP

The University of Texas has been putting forth much effort to accomplish two things for practical education in the state. First: It is

trying to make vital the industrial work already in the schools. To this end it issues a weekly bulletin which is comprehensive in material related to every day life. Second: It strives, thru another weekly bulletin, to help those schools that are about to introduce industrial courses. Heretofore many schools have copied, without making changes to suit local conditions, the course and equipment of some schools that has proved successful elsewhere. To quote from the preface to the first of these bulletins,

> Some of the adjustments cannot be made until the work is organized and in operation and some phases of the problem must be solved before the equipment is purchased, frequently before a competent teacher can be secured. It is the purpose of this bulletin to supply such information concerning courses of study, equipment, etc., as is needed by superintendents in organizing departments of manual training; also to indicate the best lines along which to develop and improve the courses of study and instruction.

This spirit of things astir has been a large part of the influence which has resulted in the last state legislature of Texas making an appropriation of $50,000 for high schools introducing industrial courses, including domestic science and agriculture. Any amount which the local school districts raise, up to $2,000, will be duplicated by the state from this appropriation.

A GOOD KIND OF RESCUE WORK

A letter from Harold C. Stillman, of West Allis, Wis., tells of a kind of rescue work that ought to be more common. He says, "In order to meet the ever-present problems of boys leaving school at fourteen years of age, we have hit upon a plan that is showing good results. The fourteen-year-old boys are taken from the third, fourth, and fifth grades and put together in the shop once a week doing largely the work of the regular sixth-grade classes. Those boys who show some originality are allowed to deviate from regular assignments and take up special projects that appeal to them, provided it is practicable, and it generally is. The tool chest is quite popular with the boys of this class. Bird houses also come in for their share.

"The results obtained so far indicate a greater willingness on the part of the boys to do good work in school and come regularly. In one case a boy who was timid and backward has developed a positiveness and manliness that is very pleasing. Many of these boys are so large

that they feel out of place in the grades and, before the shopwork was given them, wanted to leave school. I am sure that the school shop has a mission of great importance in our school system."

THE CULTURAL AND PRACTICAL IN EDUCATION

The relation of the cultural to the practical was discussed in an address given at the meeting of the National Education Association in St. Paul in July, by Arthur H. Chamberlain, editor of the *Sierra Educational News*. His subject was "The Place of Industrial Education in a Rational School System." He said:

A rational school system is, in the best sense, practical, not *mechanical,* but *practical.* The thing which has not and can not have a direct relation to the life at school or the life following school is not practical. That which is practical, that is, useful in the best sense, is cultural. Use, in some form or another, determines culture. There can be no separation of the two.

A rational school system must fit for life. To do this it must *be* life and *reflect* life, here and now. A rational school system is one that, whenever a pupil leaves it, will send him out into the world, able to utilize to the extent of his capacity, that which he has learned. The school system that is so organized as to give to its pupils that which can be used only if they pass into an advanced school, grade, or year, is not cultural.

Industrial education is practical education. Work that is offered as industrial, and that does not serve truly useful ends, is not industrial. Indeed, much of our so-called manual training, manual arts or industrial education, is not industrial. It is given either with a view to fit the participant, first, to engage in similar work of a more difficult nature later; or, second, it is offered with the idea that somehow the doing of the mechanical thing gets into the human system and becomes part of it. It circulates through the individual much as the blood circulates, and becomes part of the warp and woof of the mental and moral make-up. It supplies that which "book larnin'" cannot supply and by thus supplementing, the "whole boy is put to school."

Truth to tell, there can be no rational system of education without industrial education.

A STATE EXAMINATION

Now that state certification of all teachers in public school work is becoming more general, much interest is being shown in the character of the examinations given in the manual arts by state departments of public instruction. Many teachers who are planning to take these examination wish to know what proportion of the questions relate to the technical processes they will be expected to teach, and what propor-

tion to the special pedagogy of the subject; whether their fitness will be judged by what they can tell or what they can do, or by both; what part, if any, of the examination will be shopwork and actual drawing. Below we give the examination questions used recently in the state of Indiana. Some readers will be glad to compare these with the ones given in Iowa last year and published in the *Manual Training Magazine* for October, 1913, page 72.

INDUSTRIAL ARTS

(Answer any 6).[1]

1. (a) In your judgment what are the most important results to be achieved by means of the industrial arts work in our regular schools?
   (b) What subjects in the regular school course may be most directly correlated with the industrial arts? Indicate some of the ways in which this correlation may be made.
2. (a) In what way may a course in industrial arts contribute to the betterment of the home conditions? Answer fully and definitely.
   (b) In what way may a course in industrial arts be of benefit to a boy on the farm? Give definite examples of what you would recommend.
3. (a) In a country school, without special equipment what work in industrial arts should a teacher attempt?
   (b) How would you proceed with the work under such conditions? Be explicit.
4. (a) Name the tools which should be included in a well equipped bench for woodwork, together with the cost of same.
   (b) Make out a list of general tools sufficient for a class of twenty pupils, indicating their total cost.
5. (a) What is the purpose of mechanical drawing in an industrial arts course?
   (b) What mechanical drawing work should be included in a beginners' course in woodworking?
6. (a) What are the most important factors to be considered in organizing a shop for industrial arts work? Explain in detail.
   (b) How would you determine the kind of shop, printing, woodworking, etc., to put in?
   (c) How and to what extent would you try to study the important industries represented in the school community.
7. Outline a course of study in woodworking and mechanical drawing for a high school in a city of 10,000 inhabitants, giving time to be allotted to each subject in the course for the first year.
8. Starting at the beginning and including all the necessary steps in the process, describe the making of some article or project in woodworking as you would teach it to a 7th or 8th grade class.
9. (a) Make a working drawing to scale, of a problem in woodwork, suitable for first year high school, lettering the drawing in the title and description, using some particular type of lettering.

(b) Name at least ten problems in woodwork suitable for a 7th grade class in a city school.

[1]Teachers taking the examination in this subject are required to answer all the questions asked on the special "Information Blank," furnished by the county superintendents. Full information on these points must accompany all manuscripts in the the pre-vocational subjects.

NEW COURSE AT THE UNIVERSITY OF MISSOURI

Proof of the growing importance of the newer special subjects in education is found in the fact that the School of Education of the University of Missouri has recently issued a 52-page bulletin describing the courses offered in that institution for teachers of manual arts, home economics, agriculture, art, music and physical education. It is significant, too, that altho two-year courses are given in several of the subjects, emphasis is being placed on the four-year courses.

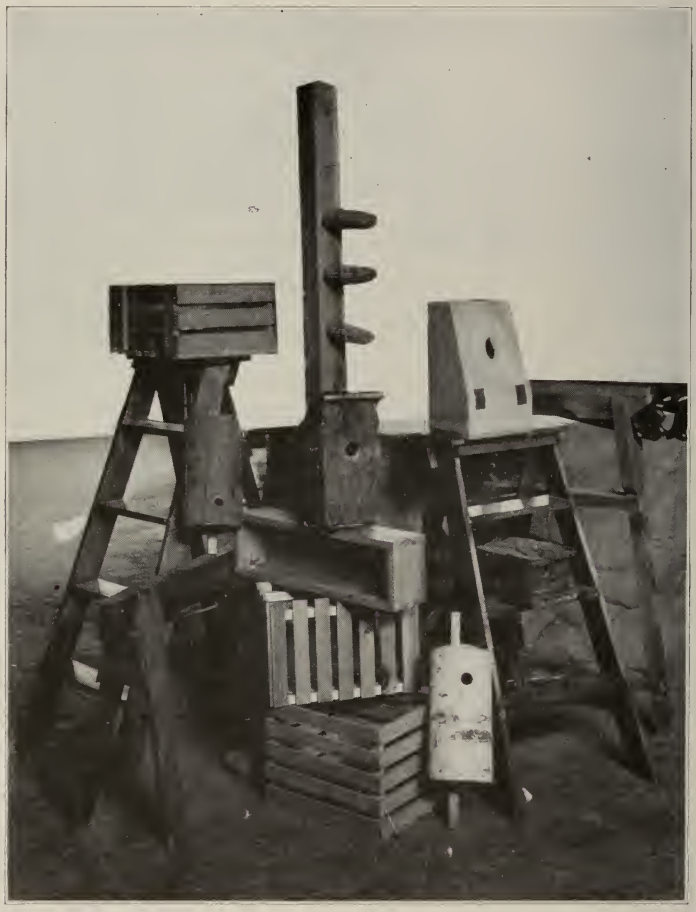
In order to enter the School of Education, which offers these courses, a regular student must have completed two years of work in the College of Arts and Sciences. Such requirements have been a handicap in securing students for some of the special courses, and this has been true in the manual arts. Recently, however, the College of Arts and Sciences has accepted more manual arts subjects for credit. Benchwork in wood, turning and pattern-making, forging and mechanical drawing are now given credit, thus making it possible for students looking forward to specialization in manual arts to take these subjects as part of their freshman and sophomore work. This will be sufficient to hold the interest of the students in their specialty during the early part of the course, and allow a greater range of advanced work in the junior and senior years.

The Supreme Court of the State of Indiana has reversed the decision of the Fountain County Circuit Court by declaring that the vocational school law of 1913 is constitutional. Councils will now be obliged to make appropriations to meet the demands of the law.

SHOP NOTES AND PROBLEMS

ALBERT F. SIEPERT, Editor

The Department of Manual Arts, University of Wisconsin, has contributed the following described and illustrated projects representing several lines of



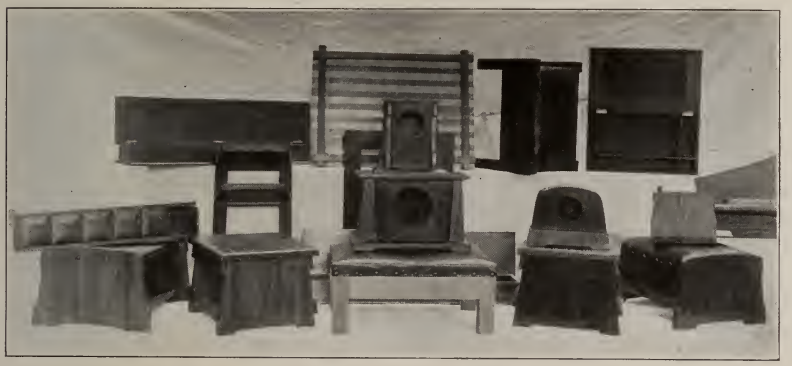
industrial activity for use in the Shop Notes and Problems Department. All projects shown have been developed by students in the high school or teacher training branch of the Department. They therefore represent the work of high school students or those who are preparing to teach in high schools. In either

case the idea of presenting possible high school problems has been in the mind of the writer whose name appears in connection with each project, and also in the mind of the undersigned who has, for the most part, been responsible only for arranging and editing the series. F. D. CRAWSHAW

Professor of Manual Arts, The University of Wisconsin

SEMI-LARGE AND ROUGH WOODWORK

The manual arts of the rural and small urban community should apply to the needs of an agricultural people principally. Our efforts in the past to represent in our shopwork typical industries have, in only a small measure, been directed toward the industry with which most of our people in the central western states are concerned, viz: agriculture.



The cut showing crates, step-ladders, a box, an egg tester, a corn drier, bird houses, etc., shows some of the wood projects which may be made in the upper grammar and early high school grades in a small community. They are suggestive of community activities and represent types of projects which require large muscle movement and none too accurate construction. They are good beginning projects, then, viewed phychologically and mechanically.

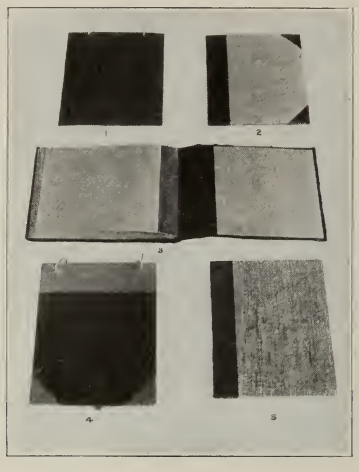
—University of Wisconsin High School Students

CLOCK CASES

The clock cases and other projects shown in the above cut are typical of box construction. The other projects are shown with the clock cases to emphasize the latitude of choice in box construction problems.

Each clock case is made of at least six pieces as follows: front, back, two sides, top and movable disk, hung at the top, to cover the opening in the back similar to the one in front into which the clock face fits. The hole in the back

receives the clock. By moving the disk to one side the clock may be wound, adjusted, etc., without removing it from the case. A bottom may be placed in the case, and in the rectangular designs corner boards may be used to serve as buttresses or pillars as shown in the two center cases. Corner joints may be butt, groove or ledge.—Ida B. Arzberger



FREEHAND DRAWING AND DESIGN

The average course of study in drawing for high school is inclined to show a lack of intensive application of a single idea affording definite graphic data of practical value. The illustration shows a series of booklets in the University High School course tending to partially remedy this.

The booklets will develop drawing or an intensive language and form the nuscleus of a cumulative mass of useful and cultural information. They will acquaint the student with simple bookbinding processes involving principles of design, and will supply thru their written text, limitless possibilities in correlation.

Fig. 1 is a hingless back, eyeletted, looseleaf notebook for bird study; their eggs, nests, habits, colors, houses, etc. Fig. 2 is a three fold sewed booklet with a cloth hinge. It is designed for utilitarian object study correlating with the household arts. Fig. 3 is a leather covered Kodak-type notebook with a double cloth hinge and flexible back. This book will contain a study and sketches of period and modern furniture. Fig. 4 is a loose-leaf notebook, with partly flexible back. The intensive analytical study of trees and their woods furnish the content. Fig. 5 is a tape or cord sewed problem with five or more sections and a cloth binding. This book, illustrated by students' line etchings, considers civic aesethics, public parks, buildings, architectural arrangement, sky lines and allied pertinent subjects.—A. Marie Anderson

DECORATIVE METAL

The above cut illustrates a series of problems in decorative metal based upon a system of grouping by progressive processes. Fig. 1 includes simple sawing, bending and riveting; Fig. 2, bending and soft soldering; Fig. 3, low raising and planishing; Fig. 4, planishing, bending, hard soldering and simple chasing; Fig. 5, box and hinge construction; Fig. 6, cold forging (handle), raising, planishing and hard soldering; Fig. 7, high raising (bowl construction); Fig. 8, enameling (champleve).

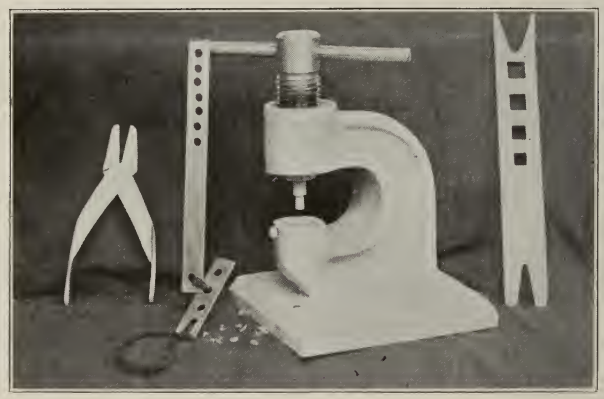
One instance of the flexibility of this system is noted in A and B, Fig. 4, where advanced students have been assigned repoussed enamelling enrichment, the characteristics of the original group still remaining intact.

—W. H. VARNUM and Students

POTTERY

This figure illustrates a similar series of problems for pottery of the utilitarian type. No. 1 is the introduction to the material by means of the incised or inlaid tile, the glaze being supplied to the student. No. 2 introduces hand-built bowls constructed by both coil and strip methods, the student mixing the glaze from a given potters' formula. The decoration is a raised motif. No. 3 is hand building with the addition of appendages, spout, handles and lid. The student computes the potters' glaze from relative amounts of assigned acid, alumna, and base content. No. 4 deals with mold construction with poured forms similar to small ramekins or teacups, showing the use of tin glazes for linings. No. 5 is essentially the decorative process of slip painting from the assigned under

glaze palette, preferably applied to an architectural tile or enrichment of cement construction. No. 6 terminates the course with a series of experimental problems in glazes. The illustration shows matt, clear, and tin glazes with a nitrate drip,



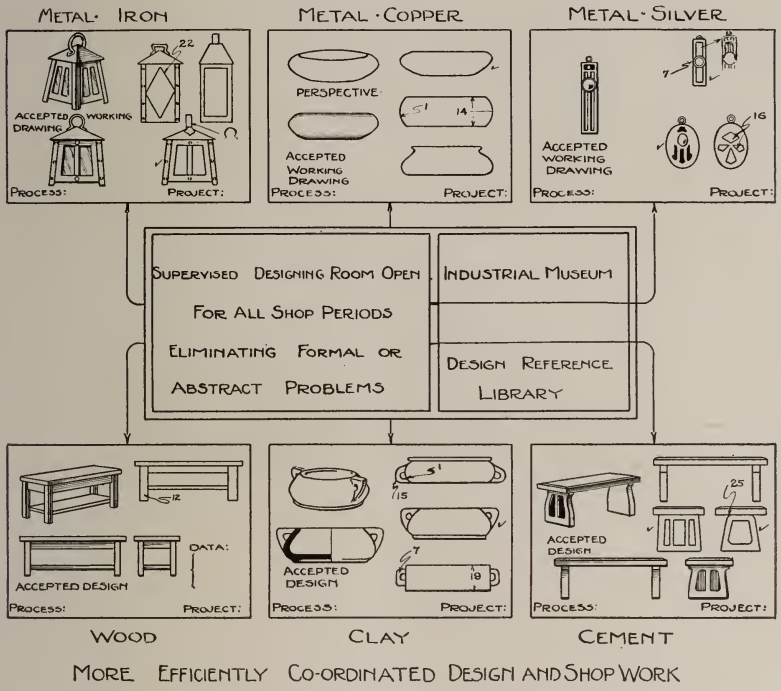
crystalline, fritted glazes and sgraffito decoration. These afford the student an opportunity to observe glaze possibilities and to accurately test his ability to glaze and fire correctly.—W. H. VARNUM and Students

SMALL HAND AND MACHINE METAL PROBLEMS

The combination wrench shown at the right is made of ¼″x1¼″ machine steel. This problem includes: laying out, drilling, sawing, filing, polishing and case-hardening. The claw at the lower end is shaped to make a serviceable box opener. The "V" at the top is notched with a file to enable one to catch a nut or bolt head with it.

The plier is made from soft cold-rolled steel ⅛″x1⅛″x6′ cut crosswise from a strip ⅛″x6″x8′ in order to have the bends crosswise of the grain. The jaw is formed ¼″ thick by folding the steel double. This problem includes laying

out from template, shearing along vise-jaw with cold chisel, bending, shaping, filing, folding, drilling, riveting and case-hardening. The plier will stand the grip of a strong man.



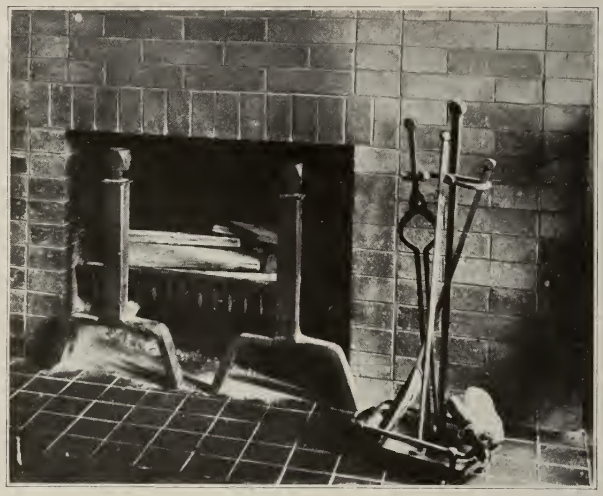
MORE EFFICIENTLY CO-ORDINATED DESIGN AND SHOP WORK

The hand screw punch in the center of the figure, involves the following machine operations: milling the base with face mill, clamping in gig on face plate of lathe, drilling, boring, chasing internal and external threads, boring spindle in center rest for punch, and making punch and die. The frame of the punch offers a problem for pattern-making and foundry practice. There are problems also in the calculation of strength of materials. The frame has a breaking strength of about five tons. One-quarter inch holes in one-sixteenth inch steel may be punched. To the left of the punch are shown two strips of such metal with holes punched in them with the droppings at the base of the punch.—A. L. GODDARD

ANDIRONS AND FIRE SET

All the metal projects except the basket in this group were designed by members of the manual arts department, University of Wisconsin and constructed

by the instructor in forging. The projects are given for the purpose of showing how the department plans and develops large type problems for the purpose of correlating design and construction, and developing projects which may serve as good examples for those who are being trained in the department for manual arts teaching positions.—Robert N. Schumann



THE DESIGN SEMINAR

The relation of drawing, design and shopwork in the University of Wisconsin is shown by the accompanying diagrammatic representation. The shop student is supplied with a text book of design. He is required to develop a sufficient number of problems to become familiar with the nomenclature and general presentation of design and to enable him to discuss intelligently problems under consideration. When the shopwork calls for a design, he goes to the designing room, and, under partial supervision, with a quantity of reference material at hand he develops a number of tentative sketches, noted at the right on each sheet in the diagram. These are crticized by the instructor who indicates the violations of design principles by giving a number for the rule violated, and by penciling changes upon the students' sketch. This design is thereupon developed into a working drawing, often accompanied by a perspective sketch. Upon completing these drawings the student returns to the shop. He again goes to the designing room when an approaching problem indicates the need of a new design.—W. H. Varnum

CONCRETE URNS

The concrete urn (p. 125) was made by casting it in a plaster of Paris mold. This mold was formed by the use of a horizontal wooden sweep cut to the profile shape of the urn. A piece of zinc similarly cut was fastened to the sweep to

serve as a protection for the cutting edge. Cylinderical handles attached to each end of the sweep made it possible to revolve the whole about on axis, of which the handles were a part, in a box two inches deeper than one-half the diameter of the urn.

Plaster of Paris in a plastic condition was poured into the box and the sweep was revolved while the plaster was setting. This produced one-half of the matrix or mold with a contour of the desired shape. The other half of the matrix was made in a similar manner. A dome-shaped core was swept up of plaster of Paris covering a wire covered wooden frame. This was done with a vertical sweep. The two halves of the matrix were then turned upside down over the core and fastened together with wires. With the mold in this position a mixture was poured in, made of one part white cement, one and one-half parts of white marble aggregate thoroly mixed with water until the mass was in a fluid condition. The concrete was allowed to season for forty-eight hours, after which the matrix and core were carefully removed to prevent injury to projecting parts. The urn was then pointed up where necessary.

The top of this urn was made in a manner similar to that described for the urn above. The pillar of this urn was made by means of a vertical sweep. It was reinforced with one-half inch Clinton wire. The base was cast in a box mold. The three parts were put together by means of a projecting

cylinder on one part and a corresponding cylindrical recess in the next succeeding part into which the projecting cylinder fitted. Thru the three parts was placed a 1½″ iron drain pipe leading to the ground upon which the urn is supposed to stand.

O. B. BADGER

REVIEWS

A Shorter Course in Woodworking, by Charles G. Wheeler. G. P. Putman's Sons, 7x8¾, pp. 286. Price, $1.50.

This book is not a discussion of a course in woodwork as its title would indicate, but is concerned with a description of the common tools and their uses, in Part I, and the operations involved in shaping, fitting and finishing wood, in Part II. In the appendix are given a few elementary principles of construction, and a number of problems in drawing and laying out work. Types of construction are also described.

The book is very well illustrated, especially Part I, in which the uses of tools and of woodworking machinery are plainly shown by an abundance of half-tones. The book will prove a helpful addition to the library of the manual training department.

Foundry Practice, by R. H. Palmer, formerly instructor in foundry practice at the Worcester Polytechnic Institute, Worcester, Mass. Published by John Wiley & Sons, New York, 5½x8¼; 332 pages, with 154 illustrations. Price $2.00 net.

Many teachers have had the same experience as Mr. Palmer before he wrote this book. They have looked for an authoritative and comprehensive textbook on foundry practice but have failed to find one. Now they can profit by his labors to produce such a book. The present volume follows the scheme of instruction used in what has been recognized as the most practical school foundry in the United States. It begins with the simplest type of mold, and leads the student or apprentice gradually thru the most difficult work in green and dry sand and loam. From the many possible examples which might have been used to illustrate the different practices, only those have been selected which are typical of the class of work to which they belong.

It is impossible to learn the art of molding by reading only, but the study of this book in connection with actual shop practice is sure to produce a more intelligent workman. The book was edited by Robert Thurston Kent.

Cement and How to Use it, Edited under the supervision of William A. Radford. Published by the Radford Architectural Company, Chicago, 6x8¾; 369 pages.

The aim of this book is to present in simple, non-technical English a practical working guide to the selection of cement, the principles by proportioning and mixing cement, and the rules of its intelligent use in various forms of construction to which it has shown itself to be well adapted. It covers a large variety of work, and should be helpful in schools as a book of reference.

An Experimental Course in Alternating Currents, by Elmer E. Burns, Instructor in Physics at the Joseph Medill High School, Chicago. Published by the Joseph A. Branch Publishing Co., Chicago, 1913. 5x7¼ inches; 102 pages. Price 75 cents.

This is a vocational school course leading to practical electrical work. It

is intended to follow such work in mechanics and electricity as is usually given in the first year of a course in physics.

This is a textbook of elementary structural design. Its purpose is to help students to an understanding of the more simple formulas and give them ability to employ such in every-day practice. The book covers beam design, columns, torsion, rivited joints, re-inforced concrete, etc., etc.

Engineering as a Vocation, by Ernest McCullough. Published by David Williams Company, New York, 5½x8 inches; 201 pages.

This book has been written to help parents to act wisely in selecting careers for their sons, but is of special value to vocational advisers in schools. It contains much excellent material.

Topic Books on Art Education. The Prang Company, New York, 1913. In paper covers, 25 cents each.

This is a series of seven books based upon the volume "Art Education for High Schools," published about six years ago. The titles are the following: Pictorial Representation, Perspective Drawing, Figure and Animal Drawing, Constructive and Mechanical Drawing, Architectural Drawing, Design, Historic Ornament and Art History. This series will be a great convenience to many teachers who want the material on one of these subjects for special use and do not wish to invest in the original book, or to supervisors who own the large book but wish to urn over to a group of teachers the material of a single chapter.

Industrial Mathematics, by Horace W. Marsh, Pratt Institute. John Wiley & Sons, New York, 1913, 5¼x8 inches; 477 pages, illustrated with more than 225 diagrams. Price $2.00.

This comprehensive book has been prepared for the use of men employed or anticipating employment in the technical industries. It has been "tried out" in mimeographed form for several years in both day and evening classes. It takes a place about midway between an engineer's handwork and the ordinary text-books on mathematics. It is thoroly practical.

Technical Algebra, by Horace W. Marsh. Part I of Construction Text-book of Practical Mathematics. John Wiley & Sons, 1913. 5¼x8 inches; 428 pages. Price $2.00.

Like "Industrial Mathematics" this is the result of an effort to put practical methods into the teaching of mathematics.

RECEIVED.

New Comprehensive Standard Dictionary. Published by Frank Magulls, New York City. Price $1.00.

This is a convenient small dictionary for general use—just the kind to keep within reach on the study table.

Report of the Commissioner of Education for 1913. Volumes 1 and 2. Washington, D. C. This volume contains a chapter on the "Progress of Vocational Education," written by William T. Bawden. This deals with vocational education surveys, the National Society for the Promotion of Industrial Education, vocational guidance, the National Association of Corporation Schools, the training of teachers for vocational education, legislation, state system of vocational education, etc. The report also contains chapters on the "Progress of Agricultural Education," "Tendencies in Commercial Education," "Popular Education in the Fine Arts" and "Educational Work of American Museums," and many other current topics of importance.

Reorganization of Manual Arts in Secondary Schools. The report of the Manual Arts Committee of the Commission on the Reorganization of Secondary Education, presented to the National Education Association as a basis for discussion at the meeting in St. Paul, July, 1914, Frank M. Leavitt, chairman.

The Training and Certification of Teachers for Agriculture, Industrial and Household Arts Subjects in the Public Schools of Indiana. William F. Book, in charge of vocational education.

Planning the Apple Orchard. By W. H. Wolff. Extension Bulletin, No. 1, issued by the Horticultural Department of the New Hampshire College and Experiment Station, Durham, N. H. An illustrated pamphlet of 36 pages.

Occupations and Industries Open to Children Between Fourteen and Sixteen Years of Age, by Anna Davis. Published by the Chicago Board of Education. This pamphlet of 20 pages refers to the city of Chicago, and is based upon interviews with employers, visits to factories and workshops, and inquiries of boys and girls.

Second Annual Report of the Board of Public Education, Pittsburg, Pa. By William M. Davidson, superintendent of schools. This volume of 388 pages treats of every department of the school system. Especially interesting to us are the reports of Frank H. Ball, director of industrial training, of C. Valentine Kirby, director of art education, and of Miss Irene E. McDermott, director of household economy.

Industrial Education Course at Oshkosh. An illustrated bulletin giving details of courses offered at the State Normal School, Oshkosh, Wis.

Manual Training. Prepared by Lewis H. Carris, assistant commissioner of education, New Jersey, issued by the Department of Public Instruction, Trenton, N. J. This is a pamphlet of 14 pages, giving information for school officials concerning the introduction of manual training, and directions as to the expenditure of money from the manual training fund of the state.

MANUAL TRAINING
AND
VOCATIONAL EDUCATION

NOVEMBER, 1914

ADJUSTMENT OF THE COMMON SCHOOL CURRICULUM TO THE VOCATIONAL NEEDS OF TODAY

W. N. Hailmann

UNDER the demands of modern democracy, public education must serve the whole people and all the people in accordance with their several needs in the enjoyment of liberty and the pursuit of happiness, as well as in the preparation for the intelligent and effective discharge of the duties of citizenship.

To confine such education to the few who may prepare for leadertion of the many by the few, to hostile class distinction, to demagogism and anarchy. Good will on the part of the favored classes may check such development for a time, but cannot permanently stay it; for liberty and happiness thrive not on charity but on justice.

General prosperity and the happiness it implies is by no means synonymous with average prosperity. The latter can reach a high mark and yet include much injustice and wretchedness; but general prosperity, ideal general prosperity, finds each individual, other things equal, in the enjoyment of such happiness as is due him in the measure of his social service; and the value of such service in the common life depends upon his ability in his chosen work, upon his realization of its relation to the common life, upon his appreciation of his varied civic and other social and even broadly human responsibilities, and upon the character of the cultural enjoyments that fill his leisure hours and add new meaning and new value to his life.

To secure these things is the purpose of every investment the community or state may make in behalf of the education of its citizens in

every walk of life. Nor can anyone of these requirements be emphasized at the expense of others or neglected without serious loss or danger to the community or state. For failure on the part of individual members of the social whole in any of the directions indicated, will expose them to loss in liberty and happiness, will make of them parasites thru some form of exploitation on the part of others, will inevitably lower the moral tone and thereby the happiness of the whole.

Every phase of hatred and greed, of hypocrisy and arrogance, of wretchedness and crime in the social world can be traced to failure on the part of the community to make adequate, broad, comprehensive, and universal provision for the education of all its members into the ability and joy of work in some freely chosen life-career, into a deep sense of civic and social responsibility, and into an appreciation of accessible cultural life-enjoyment.

It appears, then, that for its own preservation and progressive development the social body must provide for educational facilities sufficiently comprehensive and flexible to meet the needs of every citizen in preparing for a suitable life-career. Moreover, it appears that the community cannot safely delegate this responsibility to other interested factors without exposing itself and its wards to exploitation.

Now, it is all but generally conceded that the still current organization of public education, with its traditional one-sidedness, does not sufficiently meet these requirements. It provides, indeed, for a number of professional, commercial, technical, and of late also, for agricultural vocations, as well as for what it is pleased to designate as general culture; but it is strangely neglectful of those who from inclination or necessity choose industrial careers, altho these constitute the vast majority.

RECOGNITION OF THE NEED

It is gratifying, however, to note that this inadequacy is more and more keenly felt and that efforts to supplement it are becoming more and more pronounced among public-spirited citizens, among employers and workers, parents and educational leaders. We meet these efforts in the form of private and public trade schools, apprentice schools, continuation schools, industrial schools, and a variety of provisions for vocational guidance; most hopefully, perhaps, in distinct propositions and experiments looking to a reorganization of the public schools with a view of meeting this need without loss, but rather, with gain to other vocational interests and to general liberal culture.

The neglect, indeed, of industrial vocations by the school is directly derived from Greek ideals on which our school organization largely rests and which look with contempt upon manual work, an attitude further emphasized with the revival of learning and variously transmitted to us in academies, lyceums, gymnasia, and high schools modeled after them.

Gradually, however, and more particularly since the days of John Locke, it came to be recognized that there is cultural value of a high order in manual work; and with Pestalozzi and Froebel and the discovery of the law of self-activity, the cultural value of constructive and creative doing came to be more generally appreciated and utilized in the work of the schools. This culminated in the adoption of drawing and manual training as cultural subjects in the curriculum, as necessary factors in the work of general education.

At the same time, under the pressure of rapidly growing technical and commercial interests, differentiations in secondary schools came to be conceded to life-career motives within these limits, in the establishment of technical and commercial high schools and of corresponding departments in general high schools, colleges, and universities.

But still the great mass, the future industrial workers, the "practical-minded" majority are but indifferently considered. After a few years of elementary training in primary departments, the treatment of the subjects of instruction becomes more and more one-sidedly abstract, appeals more and more exclusively to the verbal memory and less and less, if at all, to productive and creative activities. Information still has less and less outlet in actual achievement, less and less bearing upon directly practical interests in life. More and more, knowledge seems to end in itself and fails to feed the sense of growing power, self-reliance and self-respect, does, indeed, rather the opposite.

In fact, the academization of the curricula still lies heavy upon our boasted systems of schools. In our elementary schools the vocational needs of the great mass of industrial workers and even those who may subsequently enter upon technical training are but scantily considered. In reading, all but exclusive stress is upon literature; the story and some descriptive matter usurp attention; interests that call for stimulus and information with reference to matters of industrial and domestic work, of science and engineering, of every-day needs and occupations are slightly touched upon or wholly ignored. The same applies in a large measure to writing, altho here the "business man" has secured a share

of attention. Arithmetic is thoroly commercialized; mensuration and concrete geometry, so valuable in industrial, domestic, technical, and agricultural life are but transient incidents.

Smilar neglect applies to matters of natural science: nature study and physiology appear, indeed, upon some programs but in time assigned to them they yield to grammar and spelling, altho in life the latter contribute much less to its prolongation and enjoyment than the former—are, indeed, acquired by the majority quite incidentally. Geography and history, as a rule, deal insistently with everything but that which the practical workers need. There is some music or what goes by that name, but the great mass of children are not touched by it, do not carry the songs in their hearts. There is some drawing, but it is prone to be forced from the start into "high art," keeps away from the needs of the worker, and rarely serves the purposes of self-expression. Sporadically we find some manual training, but the time given to it is ridiculously inadequate, and frequently the method of the work is so painfully abstract and so far removed from the children's interest and needs that it becomes not rarely as hateful as grammar. Indeed, at every point the curriculum, in matter and method, tends to academic rather than to vocational ends.

It is gratifying, however, to note that there is growing appreciation of these insufficiencies in the elementary school and a correspondingly urgent demand for its reorganization on the basis of the practical needs of the community and of the time, rather than on the ground of theoretical and historic considerations; a reorganization that shall rescue the children from the fetters of an undemocratic uniformity, that shall respect individual need and capacity and afford each child opportunity for trying and finding himself and the niche in which he can best attain joy in a freely chosen life-career of beneficent social service. More and more clearly it dawns upon us that equal opportunity for all does not imply identical opportunity, but full opportunity to each on the ground of individual needs in equipment for complete living.

THE CHASM BETWEEN ELEMENTARY AND HIGH SCHOOLS

It will be impossible to review here in detail the many experiments that have been and are being made in Europe and in our own country. I confine myself, therefore, to the presentation of a few leading phases whose importance seems to be more or less generally conceded.

In the first place, there is general consensus of opinion that in matter and method there exists a serious break between the elementary

school and the high school; and, on the other hand, an equally damaging disregard of weighty changes in life attitude which come to children with the advent of the adolescent age or about the sixth year of elementary school life. Many children, it is claimed, leave school or begin to fall back in their studies at this time, not so much because they are eager to go to work nor because it is necessary for them to do so, but because of lack of interest in the curriculum of the advanced grades which offer them apparently no forms of work that seem worth while to them and little relief from the elementary school-grind.

Some relief, it is true, has been given in such cases by the establishment of schools similar to the Elementary Industrial School at the Brownell School in Cleveland and, to a limited extent, by the establishment of technical and commercial high schools as well as by differentiated courses in general high schools.

Among the more radical plans set in operation to remedy the difficulty, the six-three-and-three plan is probably the most satisfactory. It reduces the elementary schools to six years, establishes an intermediate school or "Junior High School" of three years, and a full-fledged high school of three years. In both the intermediate and the high school the courses are flexible and promotion is by subjects, not by grades. Instruction thruout is departmental and in the hands of persons who combine the qualities of the teacher with those of the expert.

The curriculum of this intermediate school affords much opportunity for differentiation. All, it is true, share in pursuits that reveal the duties of citizenship and open avenues to the appreciation of the refinements of life. Yet for each one there is opportunity to emphasize what talent, genius, necessity or even inclination may demand.

This flexibility of the course with its wealth of opportunity enables the student under the teachers' guidance to try to find himself, his capacities, and enuthusiams with reference to the choice of a life-career. It is, indeed, of the greatest moment that in this he should choose aright, intelligently and not at haphazard; for on this choice depends his happiness and much of the happiness of those his life may touch.

Ideally, the curriculum should contain, as already indicated, for civic and cultural purposes all that is found in the current school; but in the treatment of subjects greater stress should be laid upon concrete and practical phases and upon applicability in productive and creative work in directions that appeal to the interests of the students. Thus

the empty technicalities of grammar and rhetoric should yield to opportunities for the expression and interpretation of actual thought and purpose concerning matters of immediate life-interests; the conquest of the horrors of spelling should be left largely to incidents in actual need; the puzzles of arithmetic and algebra should make room for the intelligent use of number relations in drafting and measuring, in constructive and related research work.

These and similar economies in geography and history, in nature study and physiology, etc., open wide the gates for really vital work, for work that reveals capacities, stirs purpose, and crystallizes life-career motive. Thruout, mere information concerning matters that have no such bearing, is omitted. In laboratory, drafting and art room, work shop, school gardens, and in study and recitation room, at every point of the work, learning by doing and learning for the sake of doing is the motto that inspires teacher and student alike.

Aside from its many internal advantages, this coming intermediate school has the great advantage, by its mere existence, of holding the children under instruction for a longer period and of bridging the chasm between the elementary and the high school, thereby, as experience shows, leading a greater number of children into the high school proper in its academic, scientific, technical, commercial and other quasi-professional departments.[1]

Moreover, the intermediate school, so organized, brings into the life of the child at an earlier period the influence of men teachers. The value of this cannot be overestimated. It furnishes the boy realizable ideals and examples he can emulate, and to the girl it furnishes the opportunity to gain respect for the masculine factors in life on the ground of merit. I direct attention to this without prejudice to the equally valuable influence of women in the school; for I am aware of the fact that the all but exclusive employment of men as teachers in former days had as weakening an influence upon their effectiveness as their excessive feminization has upon the schools of today. As in the ideal family we find mother and father, sister and brother, so in the school both elements should be found, if the children are to grow into ideal relationships in a social organization of women and men.

[1]Cokato, Cal., carries all the children from sixth to seventh grade, and all but two in two years—formerly from 20 to 35 annually—from the eighth to the ninth year. Berkeley, in 1910-11, lost less than 17 per cent in passing from the ninth to the tenth year, as against an average of more than 50 per cent, according to Ayers, under the old system.

For children who, under the pressure of necessity or of a firmly established desire to enter some trade, do not elect further high school training, other provisions have been made—most systematically in Switzerland, Germany and France—thru the establishment of trade school, industrial improvement schools, and continuation schools.

The chief object of the latter is to keep alive the civic and cultural development of the young worker. To this, the trade school and industrial improvement school add intensive instruction in matters pertraining to the respective trade, as a whole, with a view, in many instances, of protecting the young apprentices against the evils of mere process work. Much attention, is, or should be, given to applied mathematics and applied science, to economic and civic relations of the trade, its bearing on the welfare of the community, and other matters that condition joy and a progressive spirit in the work of the trade.

REAL PROBLEMS TO VITALIZE SCHOOL WORK

It still remains to add a few suggestions as to the place which work, tending more or less to industrial ends, should have in the elementary school or, with reference to the school organization here proposed, in the first six years of school life. Naturally, differentiation, as proposed for the intermediate school, or specalization as in the trade school or in certain departments of the high school, have no place here. In a large sense, the elementary school until the dawn of adolescent years should be broadly cultural, allsidedly liberating, affording the children free outlook in every direction of human interest. They should have every opportunity to become familiar with the various phases of natural and social environment, with the conventionalities of life, the interests and occupations of their elders. In judiciously guided productive and creative play-work, they should gain control of their own powers of adjustment and self-expression, both individual and social, in leading and in following.

I have already indicated that much still remains to be done in order to vitalize the elementary school in these directions; that the school still is prone to place undue stress on the remote, the abstract, the verbal, the formal, with corresponding neglect of the near, the concrete, the actual, the practical; that there still is too much stopping short with mere knowledge getting and too little opportunity for applying knowledge to actual interests and purposes of life; and that the

school thereby becomes distasteful to the children, a hindrance, rather than a help, in further growth and development.

"If children are forced to take in food foreign to their nature and mental interest," says Dr. Kerschensteiner, "the school will be a torment to them and to their teachers, and we are fortunate if in this we have not ruined the best that is in them, their individual talent or genius."

It is not within the scope of this sketch to outline a detailed program for a curriculum of an elementary school that would touch every interest and appeal to every child. Yet it is incumbent upon me before closing to indicate a few points that need emphasis.

Such a program should contain within limits, determined by the spirit of the time and of the civilization in which we live, all that is good in the current curriculum. To this it should add the wealth of opportunity and the flexibility with reference to the needs of individual children that are afforded by the intermediate school as sketched above.

In so far as industrial interests are concerned, it should be remembered that familiarity with them and their relations to science and art has become an important element of general or liberal culture for all who mean to take an active part in life. All need to appreciate the value of work, its meaning in the life of the individual, its significance to the welfare of the community and of the nation. No one can boast of a liberal education who has not learned to respect labor and who has not tasted the joy of productive doing.

Hence the need of such doing from the beginning and thruout the elementary school; in current kindergarten ways at first, and increasing later on in ways that rest upon sympathetic observation and respectful appreciation of the industrial and other vocational activities of the local environment; in play at first, and increasing later on under conditions that suggest workshop and laboratory, studio and drafting room, garden and field, the constructive activities of the builder and engineer.

In all grades, or at least from the third year on, there should be periods when the children, individually or in groups, have opportunity to choose occupations wholly free from compulsion; when the teacher is at their disposal as a sympathetic helper, answering questions or suggesting books or experts that can give the needed help. Under such freedom, children put forth effort which compulsion and even suggestion can never attain. Moreover, it furnishes almost ideal occasion for the child to try himself in various interests and skills.

To the teacher, too, it provides the best and surest indication of the children's capacities, talents, and enthusiasms in his effort to guide and guard them aright with reference to their vocational destiny.

GUIDING PRINCIPLES

Permit me, in conclusion, to sum up in a few sentences the considerations that should guide all public education, in which preparation for industrial careers is in no way less worthy and less important than preparation for any other calling.

In the first place, public education in a democracy possesses as its chief and universal aim preparation for citizenship. This involves efficiency and joy in some worthy work and a sincere willingness to place such efficiency at the service of the community or of the state under conditions of mutual justice and good will. It involves further, on the part of all citizens, a fair degree of general culture, the sympathetic appreciation of the duties and enjoyments of life.

In a general way, every active member of a community is efficient in the measure in which he knows his environment in its relations to his well-being, and has learned to adjust himself to its necessities, as well as to adjust his environment to his needs; in other words, in the measure in which he has cultivated productive and creative power and consequent joy of work.

Nor is such appeal to the produtive powers to be confined to possible or probable future workers. It is needed by all pupils in the elementary school, not so much for the skill it may bring, but more for its influence upon character development, its cultivation of sense of power; of self-reliance, of initiative, of the habit of seeking knowledge less; perhaps, for its sake than for the sake of increased power to achieve.

In the elementary school, therefore, as well as to some extent in the intermediate school, the curriculum will favor studies that stimulate the desire of concrete achievements and consequent sense of power. Thus abstract grammar and much of current literature will be postponed and yield to applied mathematics and applied science with stress quite early upon concrete geometry and physics and the supreme "joy of making." Similarly, drawing will be placed more in the service of the productive and creative life, serving self-expression in drafting, planning, and decoration, while fine art will grace a later period.

Most prominent, perhaps, in the inner organization of the school work will be the constant effort to stir individual initiative with its train

of self-reliance and self-respect on the part of the children, the consequent suppression of dead-level uniformity and encouragement of individual judgment. To this will be added the beneficent moralizing influence of social work, of deliberate division and coordination of effort in the attainment of common ends.

I am aware that much of this and other features which I forbear to touch upon lie in the future, partake of the nature of ideals; but progress needs ideals, cannot live without them. Moreover, the rapid development of public education in the direction indicated, both at home and abroad, together with the growing clearness of the conviction on the part of the people, in many localities, that among the natural resources of the community none is more precious and worthier of conservation than its children and that no investment yields richer returns than investment in their education, give assurance that realization is within reach.

A MAN MAY KNOW AESCHYLUS IN THE ORIGINAL AND YET NOT BE WELL EDUCATED IF HE DOESN'T KNOW THE SCIENCE OF THE WORK BY WHICH HE EARNS HIS LIVING.

—Edward J. Tobin

THE PRESENT STATUS OF VOCATIONAL WORK IN THE ELEMENTARY SCHOOL

PHILIP S. HASTY

SINCE time began there has been a continual warfare between the individual and its environment. Those individuals who were the most adaptable, and in other ways best suited to cope with the exigencies of life, survived and propagated their kind. So the struggle of the child within our public school system, since its establishment, may be likened to this life process—"the survival of the fittest."

The public school has been, and still is, to a large degree, a highly selective institution, in which those boys and girls who could sit still and listen, who could do the traditional thing and not kick over the traces, were retained for further "education"—for high school, college, and the professions.

Today, with the changing views in psychology, the *individual* looms large on the educational horizon. With the gradual increase in our social point of view, society feels more conscious of its burden.

Our schools are growing more and more to realize that to them belongs the stupendous task of bridging over the gap between the interests and activities of childhood, on the one hand, and the race-wrought values of civilization, on the other.

This is the age of the individual—of childhood, of youth, and of the adult—in education, and it is to the adjustments being made to the individuality of youth that the following pages address themselves. The material presented has been obtained from many sources and has been used freely, without quotation marks, except in specific instances:

The original study contained data from twenty-two cities:

Albany, N. Y.
Berkeley, Calif.
Boston, Mass.
Calgary, Alberta.
Chicago, Ill.
Cincinnati, O.
Cleveland, O.
Evansville, Ind.
Everett, Wash.
Grand Rapids, Mich.
Hackensack, N. J.
Indianapolis, Ind.
Jersey City, N. J.
Los Angeles, Calif.
Mt. Vernon, N. Y.
Newark, N. J.
New York City, N. Y.
Oakland, Calif.
Rochester, N. Y.
Seattle, Wash.
St. Paul, Minn.
Yonkers, N. Y.

It is only possible, at this time, to consider, individually, the work of four of these—Los Angeles, Seattle, New York (Boys' Vocational School), and Cincinnati—which may be regarded as types. The conclusions and suggestions, however, are based upon the complete study.

LOS ANGELES

Los Angeles was one of the first cities to reorganize its public schools upon the basis of six years in the elementary school, three years in the intermediate or junior high school, and three years in the high school proper.

The main purpose of the Los Angeles high schools (junior and senior) is two-fold, namely: *First,* to give the boys and girls an opportunity to fit themselves for the immedimate duties of life thru the development of their mental, moral, and physical powers, and the social natures as manifested in a thoro English education; *Second,* to give those who desire to enter their life work thru the avenues opened by the colleges, universities, technical schools, and art institutes, the largest possible assistance thru courses of study and units of work especially arranged for them.

The desirability of a definite (pupil's) aim in either of these fields cannot be overestimated. A course of study deliberately chosen after the student's careful consideration of his desires, tastes, tendencies, and aims, and persisently pursued thru a continuous period, will be far more valuable than frequent change of courses.

The departmental plan of work is followed in general, three courses being offered: (a) General, (b) Commercial, (c) Vocational.

The time allotments, broadly, are as follows:

	Seventh			Eighth		
	Gen.	Com.	Voc.	Gen.	Com.	Voc.
Total length of week.....	1500	1500	1500	1500	1500	1500
Time given to academic work...	800	800	800	960	680	600
Industrial work and drawing...	240	Com.400	240	160	Com.400	600
		Ind. Elective			Ind. Elective	
Miscellaneous (Approx.)[1]	400	300	460	380	420	300

A detailed description of courses and subjects may be obtained from the "Courses of Study for the High and Intermediate Schools of the Los Angeles City School District," published by the Board of Education.

[1]Part of this time is given to elective subjects.

SEATTLE

The Board of Directors two years ago, 1911, authorized the establishment of industrial or prevocational courses of study in several of the elementary schools. There are now nine of these centers located in different parts of the city.

In Seattle, an industrial or prevocational center is a group of rooms—two classrooms, a shop, a cooking room, and a sewing-drawing room—located in a grade school building. In this group of rooms are gathered the boys and girls from the seventh and eighth grades who have elected this modified elementary course.

Modification of the traditional course is made in three ways: (1) the daily program is divided into two divisions, three hours for the academic or book work, and two hours for the industrial work. (2) The second change is in the organization. The boys and girls are in separate classes in both academic and industrial work, because of the different kinds of work they do. (3) This makes possible another important difference, and that is that the school or academic work of each group of boys and girls centers upon the handwork of each and its meaning in the social and industrial life of the community.

The course is broadly educational, just as the traditional grammar grade course aims to be, but it employs a different selection of material and a modified program of work. It represents a new effort to develop a pupil's natural interests and powers in such a way as to contribute most to his intelligence, self-reliance, and usefulness.

The rank of this course will correspond to the seventh and eighth grades of the usual school course, and will require two years for its completion. Pupils selecting the manual arts course in the high school will be given one year's advanced credit in manual training or domestic art.

This course is open to any boy or girl thirteen years of age or over, who has completed the equivalent of the present sixth grade, upon request of parent or guardian and the consent of the principal of the school last attended. The number of pupils in each industrial class is limited to twenty-four boys or twenty-four girls, a total of ninety-six pupils to a center. The course includes:

For Boys	*For Girls*
English	English
Geography-History	Geography-History
Arithmetic	Arithmetic
Mechanical Drawing	Drawing and Design
Shopwork	Sewing
	Cookery

Following is a fair estimate of the time devoted to the academic and industrial work as compared with the regular seventh and eighth grades:

	Seventh		Eighth	
	Regular	Industrial	Regular	Industrial
Total length of week	1500	1500	1500	1500
Time given to academic work	1050	900	1050	900
Industrial work and drawing	150	600	150	600
Miscellaneous	300	Some Option	300	Some Option

BOYS' VOCATIONAL SCHOOL, NEW YORK CITY

Purpose. The school is intended for those boys who desire an education that will prepare them for industrial work as distinguished from office work. Pupils will be afforded an opportunity to learn the elements of a trade and to study architectural, freehand, and mechanical drawing, while continuing their general education along lines that will fit in with this work.

Admission of Pupils. Pupils who have graduated from an elementary school are admitted on the presentation of their graduation card. Pupils who have not graduated may be admitted under certain conditions, if they are fourteen years old.

Length of Course. The course is designed to cover one year or two years of work. Provision is also made for those who desire to continue longer in the school. Every boy who enters is expected to remain for the full course.

School Calendar. The school is open every month in the year except August. The holidays are the same as in the other schools of the city. There are no sessions on Saturday. The school day begins at 9:00 a. m., and extends to 5:00 p. m., with one hour for lunch. The object of this arrangement is to accustom the boy to the realities of the business world.

System of Instruction. Those boys who know definitely just what trade they want to follow, are permitted to start at that work and to devote most of their time to it. Those boys who have not decided on any special work are allowed and required to take several lines of trade work. The instructors can then advise the boys intelligently and guide them to a wise choice. After this has been done the pupils will devote their time to the trade selected. In addition to the trade work, all the boys are

required to take trade drawing, together with the non-vocational subjects, to which they devote about one-quarter of their time.

COURSES OFFERED

A. Vocational

Woodwork: House carpentry and construction; cabinet-making and bench-work; wood-turning, pattern-making in wood; use of wood milling machinery.

Metalwork: General machine-shop practice; sheet metalwork; forging; plumbing; electrical wiring and installation.

Printing: Composition and press work.

B. Drawing

Mechanical drawing: Working drawings; isometric drawings; architectural drawings.

Freehand drawing.

Industrial design.

Making and reading of blueprints.

C. Non-Vocational Subjects

Trade mathematics.

English.

Industrial history, civics.

Industrial and commercial geography.

Applied physics and chemistry.

Simple bookkeeping.

Elements of commercial law.

Graduation. Upon completion of the prescribed course, pupils are given a diploma which certifies that they have graduated from the Vocational School.

No attempt is made to prepare pupils for high school.

Following is a general estimate of the time allowed to each group of subjects, compared with the regular seventh and eighth grades:

	Seventh		Eighth	
	Regular	Vocational	Regular	Vocational
Total length of week	1500	2100	1500	2100
Time given to academic work	880	525	920	525
		525		525
Industrial or trade work and drawing	160	1050	160	1050
Miscellaneous	460		420	

CINCINNATI, OHIO

(Taken from the report of the Calgary Commission which visited Cincinnati during the summer of 1913.)

Classification of Continuation Schools in Cincinnati:

I. Voluntary continuation schools for those over sixteen years of age.

1. For machinists apprentices, machine-shop, pattern-shop, and drafting trades.

2. For printers apprentices in the eleven trades classed as the allied printing trades.

3. For saleswomen—A course in salesmanship, fabrics, and applied art, for young women in drygoods and department stores.

4. For housewives—In home economics, sewing, dietetics, sanitation, etc., in thirty-five centers in the city. Connected with Mother's Clubs.

II. Compulsory continuation schools, for those at work between 14 and 16 years of age, classified into divisions corresponding to the sixth, seventh, and eighth grades of the elementary school for two-thirds time, the remaining time being given to industrial or commercial work.

SCHOOL FOR APPRENTICES

This school is a development from work maintained by private firms in the machinist's trade and a group of allied printing trades. It is seven years old, the past three having been under the Board of Education. The attendance is voluntary. All pupils are over sixteen, the oldest being twenty-three. They are paid for their attendance under the Ohio law of 1911, which was largely the result of this school's experience.

The school is carried on in an old elementary school building. The equipment is exceedingly simple and the school gives only that which cannot be given in the actual trade shops. The school hours are from 7:30 to 11:30 a. m., and from 1:30 to 5:30 p. m. All pupils attend one of these periods each week. The staff is composed of one director, one foreman printer, and one machinist.

SCHOOL FOR SALESMANSHIP

This school was opened in May, 1911, under the direction of the supervisor of continuation schools and in immediate charge of an elementary teacher, who had previously been granted a three month's leave

of absence to attend a special course in Boston. Two hundred young women were enrolled from some twenty-five business houses, the employers sending them for half a day weekly, at full pay.

COMPULSORY CONTINUATION CLASSES

In May, 1910, largely as the result of the work of the superintendent of schools, and Cincinnati school board, the Ohio Legislature enacted the following law:

> In case the board of education of any school district establishes part-time day schools for the instruction of youths over fourteen years of age, who are engaged in regular employment, such board of education is authorized to require all youths who have not satisfactorily completed the eighth grade of the elementary schools, to continue their schooling until they are sixteen years of age, provided, however, that such youths, if they have been granted age and schooling certificates and are regularly employed, shall be required to attend school not to exceed eight hours a week, between the hours of 8:00 a. m. and 5:00 p. m., during the school term.

In September, 1911, compulsory schools were opened. The latest figures available show that 2,300 children were in attendance in compulsory continuation classes in Cincinnati.

SCHOOL FOR HOUSEWIVES

The home economics classes are attended by mothers and other adult women, who cannot well attend evening school. These classes will not be further considered here.

(*To be continued*)

INTRODUCTORY PROBLEMS IN ARCHITECTURAL DRAWING, III

GEORGE E. CHANDLER

STUDENTS almost invariably have trouble in making their first assembly drawings. The reason for this is obvious. In beginning drawing the emphasis is and should be placed upon the object to be drawn, be that a figure or a detail of a larger object. The common error however, is to emphasize the smaller details without showing their relation to the completed unit. Hence it is that even advanced students are often completely lost when asked to make an assembly drawing. They are familiar with the parts of the objects, but do not know how to put them together.

To avoid this difficulty the beginning problems in any course of drawing should be of a character which will permit the assembling of parts previously drawn in detail. Such assemblies must of course be simple in design. The ability, however, to think of the different parts of the object in their relation to the whole will be of special value to the student throughout the course, and is well worth emphasizing.

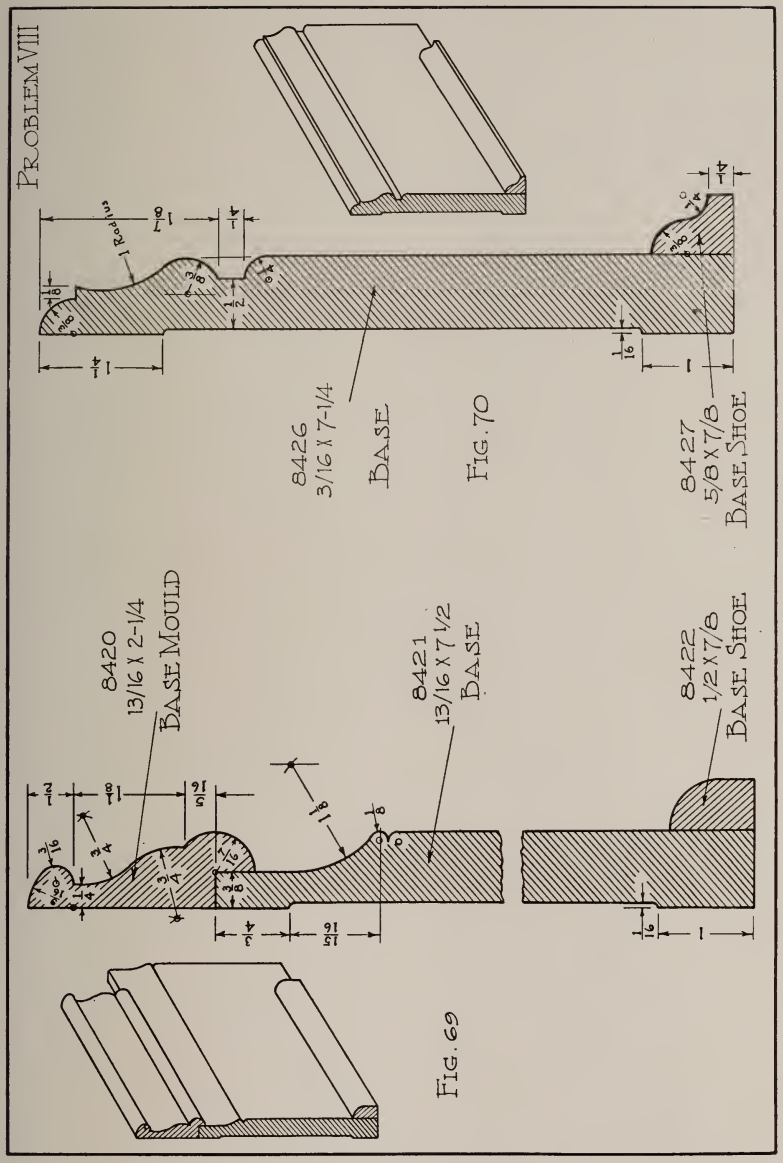
To this end the elements studied in this and the preceding articles have been assembled wherever possible to permit the student to see more clearly their relation to house design and construction.

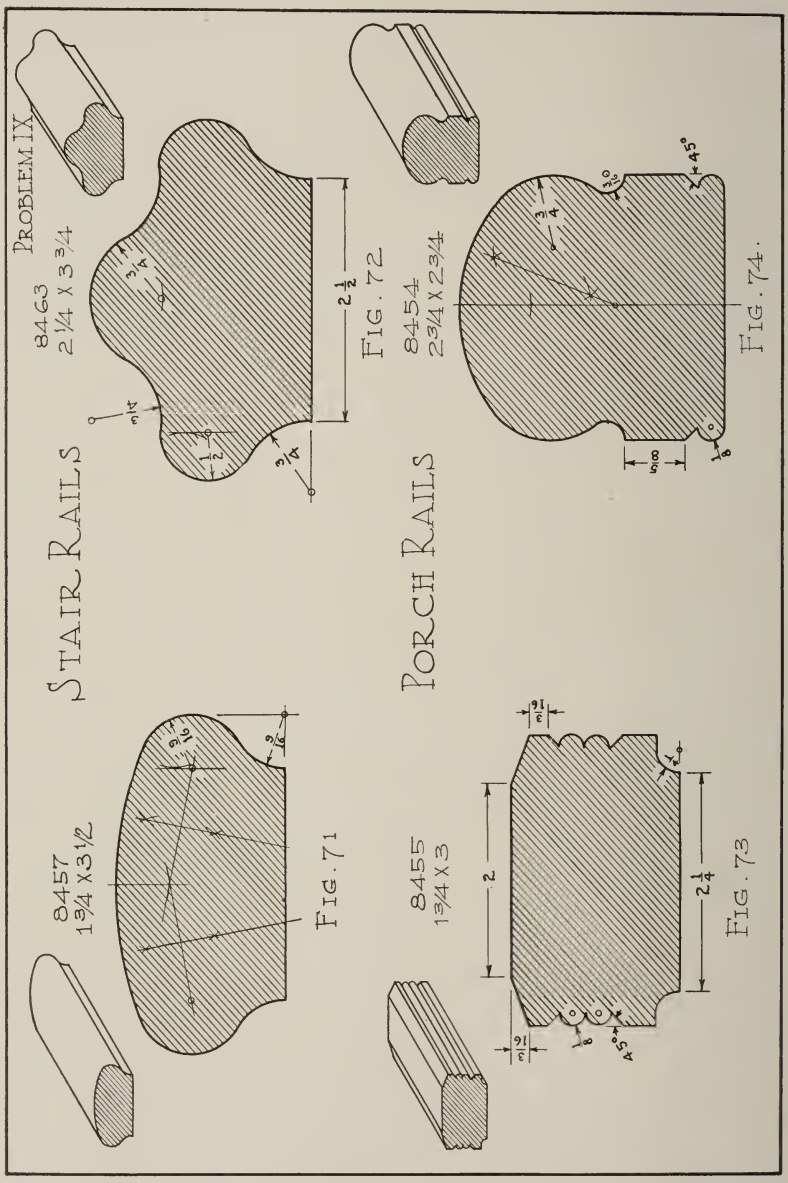
Problem VIII embodies all the construction previously studied in the form of an assembly drawing. Note that, as the student progresses, less of the method of construction is indicated.

Problem IX is especially intended to make the student think. Only such suggestions as are necessary are given. Begin by blocking in a rectangle the exact size of the overall dimension. Be sure to leave in all construction lines in pencil.

Problem X indicates the method of representing two common kinds of doors. In Fig. 76 distances "A" should be equal. Draw to scale 1″=1′—0″.

Problem XI shows the details of a double hung window and frame. Draw to scale 1″=1′—0″. Section 6*d* is enlarged to a scale 2″=1′—0″.


PROBLEM VIII
8420
13/16 X 2-1/4
BASE MOULD
8421
13/16 X 7 1/2
BASE
8422
1/2 X 7/8
BASE SHOE
FIG. 69
8426
3/16 X 7-1/4
BASE
8427
5/8 X 7/8
BASE SHOE
FIG. 70


PROBLEM IX
STAIR RAILS
8457
1¾ X 3½
8463
2¼ X 3¾
PORCH RAILS
8454
2¾ X 2¾
8455
1¾ X 3
FIG. 71
FIG. 72
FIG. 73
FIG. 74.

PROBLEM X

FRONT DOOR
BEVEL PLATE GLASS
3'-0" X 7'-0"

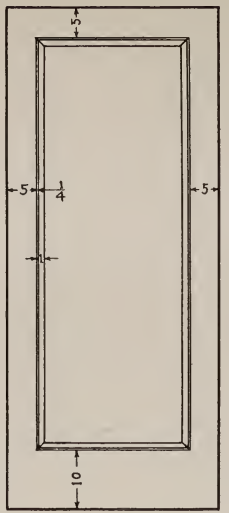


FIG. 75

INSIDE DOOR
FIVE CROSS PANELS
2'-8" X 6'-8"

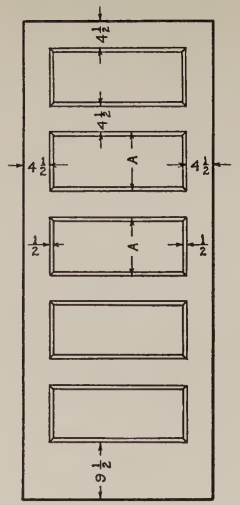
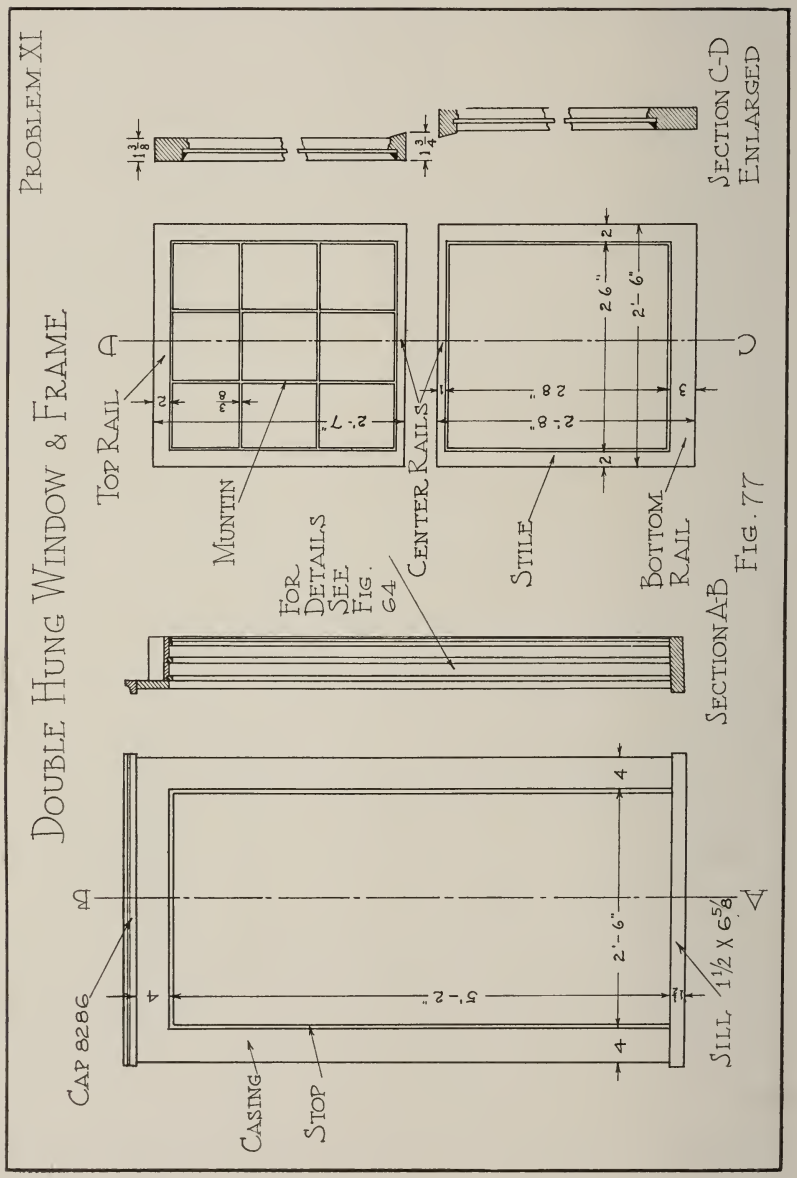


FIG. 76


PROBLEM XI
DOUBLE HUNG WINDOW & FRAME
TOP RAIL
MUNTIN
FOR DETAILS SEE FIG. 64
CENTER RAILS
STILE
BOTTOM RAIL
SECTION A-B
FIG. 77
SECTION C-D ENLARGED
CAP 8286
CASING
STOP
SILL 1½ X 6⅝

SIMPLE UPHOLSTERING

Emil A. Johnson

UPHOLSTERING in its broadest sense takes in the furnishing of a house with draperies, curtains, and other hangings; bedding; and coverings for couches, chairs, and stools; also coverings for carriages and automobiles.

The word upholster, or upholsterer, designates the workman who hangs draperies or puts textiles on furniture. In the early days of this craft, as well as today, the draperies had to be put up in such a way as to retain their shape, and textiles had to have stuffing and springs put under them to give them a permanent form. This holding up quality led to the use of the words "upholder," "upholster," "upholstering," and "upholsterer."

"The Egyptians from the earliest times used upholstered couches, chairs, and footstools," says Richard Bitmead. "It is known, too, that their neighbors, the Assyrians, excelled in weaving, and practiced the art of decorating draperies by the introduction of gold in the woof. The rich carpets of Persia and the muslins of India were in use for ages before the Romans set foot in Britain, and there can be little doubt but that the Oriental people raised the art to a very high standard, and long before the trade was known in Europe. But at the present time, much more so than formerly, the progress of the arts, the refinements of taste, the caprice of fashion, and the habits and requirements of luxurious ease, which have extended to all classes of society, have given a greater impetus to the trade and a far higher importance to the art of upholstery than it has ever before attained."

According to W. J. E. Crane, who has revised Mr. Bitmead's work, "It was the rude Gothic races (the ancestors of us modern English) who first began to realize that quality which we present day folk term "comfort."

"The old time castle or baronial hall, with its strong stone walls and stone floors, was, so far as comfort went, little better than the clay hut of the feudal serf; but when the ladies of the baronial family had excogitated, or acquired the art of needle craft, and had become proficient therein, the "up-holder" sprang into being, as a necessary adjunct to an important family. The ladies' needlework (tapestry) was obviously adapted to drape the rude stone walls of the feudal hall, and

the artisan who could drape or hang it effectively and without injury was a useful dependent, or tradesman, who, as he caused the tapestry to "hold up," naturally became known as an "up-holder," or "upholsterer."

TOOLS

The only tools needed in simple upholstering besides those in an ordinary manual training shop are a gimp hammer, a webbing stretcher,

Fig. 1.

a pair of scissors, a regulator, and straight and curved needles. There is no difficulty in getting any of these except the gimp hammer and curved needles which will have to be purchased from some firm handling upholstery supplies.

In Fig. 1, from left to right, is illustrated a webbing stretcher, regulator, gimp hammer, and a pair of scissors.

The webbing stretcher can easily be made by taking some sharpened nail points and forcing the blunt ends into the end of a piece of board $3\frac{1}{2}''$ wide and $7''$ long.

The scissors can easily be gotten, as any pair will do, but a pair $8''$ or more in length will prove handier than smaller ones.

The regulator is merely a long nail or wire, sharpened at one end, used for the purpose of sticking through the muslin cover and rearranging the stuffing where there is any uneavenness. A heavy wire bent in the form of a ring at one end and sharpened at the other will do.

The needles will not be needed till one takes up work requiring springs.

MATERIALS

The first thing in materials to be considered is the webbing. The two best kinds are the L. M. C. and the B. F. M. The L. M. C. is of closer weave and of better quality, so it will stand more strain before its elasticity gives out. There is only about 30 cts. difference on an 80 yard piece. The L. M. C. comes in two width, 3½″ and 4″. The 3½″ width is ordinarily used. This can be bought for about $1.65 per 80 yard roll.

Burlap is the best material to use over webbing or over springs. There is not that likelihood of ripping, as in most cloths, when a hole is once started. There are three qualities—light (8 oz.), medium (10 oz.), and heavy (12 oz.). The 10 oz. is quite heavy and of a very good quality for our work. This can be purchased for 9 cts. a yard of 40″ width.

There are several things that may be used for stuffing. Curled hair is by all means the best, but it is also the most expensive. It can be had for 30 to 65 cts. a pound, according to the quality. The stuffing we use is tow which can be purchased by the 100 lb. bale at 2 cts. a pound. There are three grades of tow—fine, medium, and coarse. The fine quality should be used, for the coarser materials show unevenly thru the cover after the piece of furniture has been used for a while. Even with the medium tow, it is necessary to use a layer of wadding to prevent ridges showing thru the cover. Other stuffings that might be used are moss, floss, and excelsior. For boat cushions cork shavings are used.

When goods are desired between the stuffing and the cover, unbleached muslin should be used. In cheaper work this is left out, but in our work it is of advantage. It is much easier to apply the outside cover when the seat has been given the proper shape by the muslin. If it is found that the seat has not the proper shape it is easily remedied by adding a little more stuffing or by the use of the regulator. Muslin can be bought for 7 cts. a yard 36″ width.

Wadding is a kind of stuffing arranged in sheets. It is used for laying on top of the other stuffing to give the cover a smooth, even appearance. When curled hair is used, the wadding is necessary to prevent the ends of the hair from sticking through the cover. It comes in sheets 30″x36″. The one pound quality can be bought at 25 cts. a dozen sheets.

Sometimes it is desirable to place goods under the rails to prevent any dust that may work through the burlap and webbing from falling on the floor. For this purpose cambric is used. It has a certain finish which makes it dust proof, but it tears very easily, so it could not take the place of muslin which is used over the stuffing. It costs about 5½ cts. a yard, and comes 24″ in width.

There is an innumerable number of outside coverings, and one must use good taste in selecting a proper one. It is evident that office and library furniture require coverings of a different quality from furniture intended for the living room, and dining room furniture requires different treatment from bedroom furniture. A footstool may very properly be given a covering of a different character from that of a chair seat. And when it comes to selecting figured goods one has even more difficulty. The figures on goods for a sofa or davenport should be very different in size from those on goods for a chair seat or back.

There are three classes of goods to choose from for outside covers: leather, textiles, and artificial leather. The latter serves our purpose very well to begin with, and is inexpensive. Leather comes at 16 to 36 cts. a square foot in whole hides and up to 50 cts. a foot when cut to size. Cloth or textile covers cost from $1.00 to $3.00 a yard ordinarily, and often $10.00; and if tapestry were to be used the cost would be considerable. It sometimes takes an experienced weaver a year to weave a square yard of tapestry. Artificial leather can be bought for 60 cts. to $1.25 a yard. These goods are from 50″ to 54″ wide. Some of the artificial leathers are Marokene, Morocoline, Chase Leather, Hercules Leather, Victor Leather, Pantasote, Mole Skin and Mule Skin. Some can hardly be detected from genuine leather and many are very durable.

Gimp is a narrow edging used for covering the raw edges of the cover, and the common tacks with which the cover is first fatsened in place. It comes in rolls containing from 25 to 36 yds. Black imitation leather gimp costs 20 cts. a roll of 25 yds., and brown or the Spanish effect, costs 35 cts.

There are three kinds of nails that might be used: Solid leather, Perfection, and Metalene. Metalene has proven the most satisfactory. These come in sizes No. 230, 240, 250, 260, and 270. No. 230 has a $\frac{5}{16}$″ head, No. 240 has a $\frac{3}{8}$″ head, No. 250 has a $\frac{7}{16}$″ head, No. 260 has a $\frac{9}{16}$″ head, and No. 270 has a $\frac{3}{4}$″ head. The No. 250 is used in our

work. These come at 80 cts. a thousand for the plain and 90 cts. for the Spanish effect.

Upholsters' springs can be purchased from 3″ to 16″ in height. They cost 6 cts. a pound, and weigh from 22 to 100 lbs. per gross. This makes the cost approximately from 1 to 4 cts. a piece. The 9″ ones are mostly used, and their cost is a shade over 2 cts. a piece. It is better to get springs a little longer than necessary than too short, for they can easily be tied down. They should in any event be twice as long as the width of the rails into which they go.

FIG. 2

Spring twine is needed for tying the springs. No. 60, 4 ply Italian hemp serves this purpose very nicely. This can be purchased for 27 cts a pound. It comes in one pound balls.

Stitching twine is also needed for spring work, and for this purpose No. 252 elm flax stitching is used. This comes in ½ lb. balls at about 10 cts. a ball.

WEBBED FOOT STOOL

Fig 2 represents a foot stool which makes a very interesting problem for beginning upholstery.

Tools required: Gimp Hammer, Webbing Stretcher, Scissors.
Materials required:

2 yards Webbing, L. M. C. $3\frac{1}{2}''$.
5 dozen Tacks, 10 oz.
1 piece Burlap, 12 by 18″.
2 pieces Burlap, 3 by 8″.
2 pieces Burlap, 3 by 13″.
$\frac{3}{4}$ lb. Tow, fine.

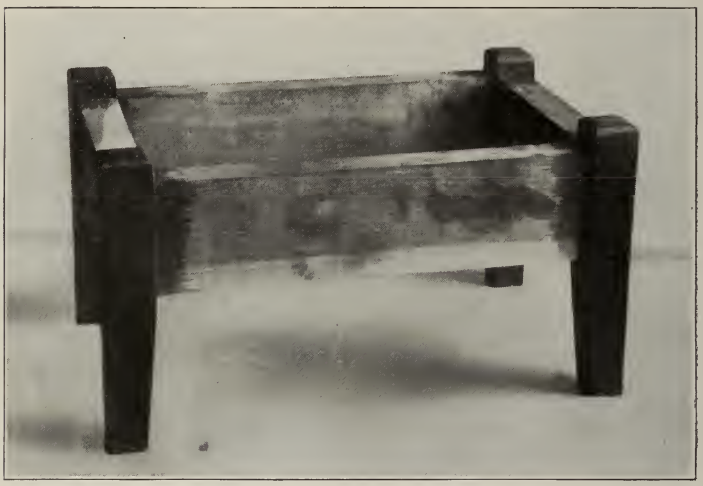


Fig. 3.

1 piece Muslin, 14 by 20″.
1 piece Wadding, 10 by 16″.
1 piece Marokene, 19 by 25″.
1 piece Gimp, 2½ yds.
5 dozen Metalene nails.

Fig. 3 represents a class of furniture from a stool to a chair which requires the webbing to be taken on the top edges of the rails and having them entirely covered with the goods, allowing only the legs to be seen. The rails should be placed ½″ below the rounded part of the legs, and should be at least 1″ or 1⅛″ thick. This extra thickness is needed to give room for the several rows of tacks and to insure it from being split by the heavy tacks holding the webbing.

Take a rasp and round off the inside arrises of the rails. This prevents the webbing from being cut as it otherwise would be in time.

The placing of the webbing is of great importance, as the durability of the work depends to a great extent upon its quality and proper appli-

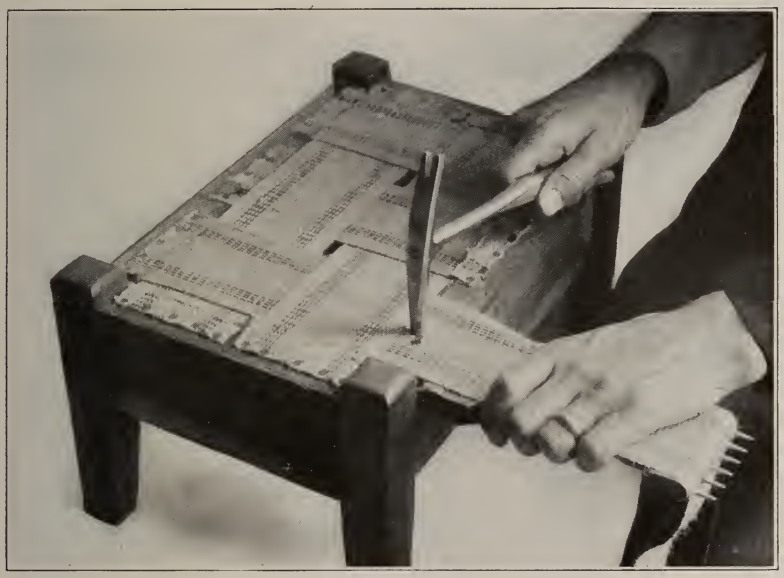


FIG. 4

cation. The webbing should not be cut from the original roll until it is being used, for this enables one to use the webbing stretcher without wasting the webbing. Both ends of the webbing should be taken out so as to have two free ends to work with at the same time. Fig. 4 illustrates the method of using the webbing stretcher.

Fold the end of the webbing over about 1″ and tack with five 10 oz. tacks as near the middle of the rail as possible. This is illustrated in Fig. 5. The ends of the webbing should be folded over and not under because the tacks will hold better. The middle webbing should be placed first to facilitate equal spacing between the strands. The other free end of the webbing roll should be tacked on the opposite side in like manner, but so as to get proper spacing. Fig. 5 shows the ends tacked and stretched from the same side, but in tacking them from opposite

sides it tends to prevent splitting, for the last ends tacked are to have seven tacks. After the first end is fastened with five tacks use the webbing stretcher and pull the webbing across as tight as it will stand fastening it with four tacks while in this position. Do likewise with the

Fig. 5

second strand. Cut each piece about an inch from the tacks and fold over and retack with three tacks. Do the same with the third strand that goes across the stool. Before tacking the two strands that go the long way they should be woven through the cross strands as illustrated in Fig. 5. The spacing between each strand or between the outside strand and rail should never exceed 2″.

Cover the webbing with burlap. The edges should be folded over and tacked with 4 oz. tacks about $1\frac{1}{2}$″ apart. The edges of the burlap should come just outside the ends of the webbing. This can be seen in Fig. 6.

In upholstery one should try to keep the cover away from the wood as much as possible. This is desirable for two reasons: to keep the cover from becoming cut and worn thru very quickly, and to avoid the uncomfortable feeling of coming in contact with a hard resisting edge.

A simple way to keep the cover off the rails in this foot stool is to attach a firm edge of burlap and tow all around the top. This edge or rolls is made by tacking strips of burlap on in such a way that tow can be rolled up in them and retacked behind the roll. The first row of

FIG. 6

tacks should be placed so that the heads come even with the outside edge of the rail. The strip of burlap on the farther side in Fig. 7 is tacked on in this way.

The roll on the near side is completed. On the left-hand end the burlap is partly rolled back, revealing the tow in place. The tow must be thoroly worked in with the fingers to make an even edge and the burlap pulled around tight to make it firm.

Fig. 8 shows all four rolls in place ready for corner blocks.

In Fig. 7 one of the corner blocks is in place. This block is fitted behind the rolls and is cut in such a way that one looks toward the end grain of it. Corner blocks are needed when the gimp is to be continued around the entire edge of the cover. In that case one has to place a

FIG. 7

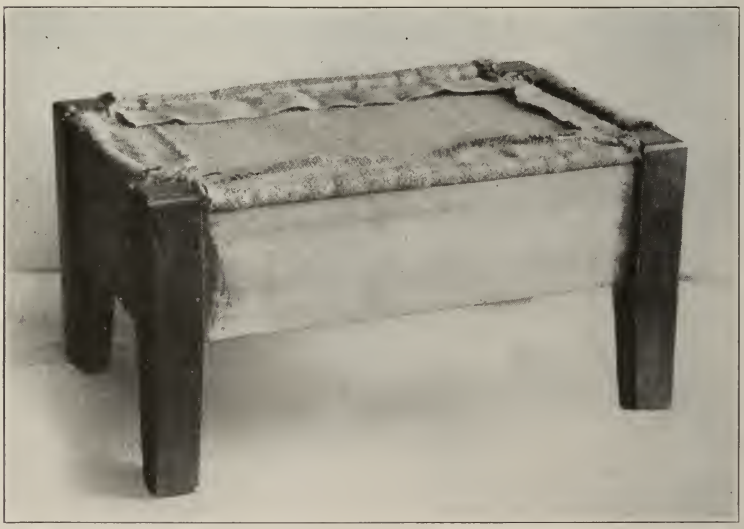


FIG. 8

nail ¼″ inside of the leg so as to fasten the gimp at the turn. This can easily be seen in Fig. 2. The corner blocks should be nailed into the legs with at least two brads. This helps to keep the blocks from splitting. Nail them also to the rails.

FIG. 9

The tow is now taken and pulled out thoroly and placed upon the stool, making a rounded heap from the top edges of the rolls. This tow must be packed and worked into place very thoroly to secure an even seat. The hands can tell when the packing is even much better than the eyes.

Now stretch and tack the muslin into place as seen in Fig. 9. The muslin should be slip-tacked in the center of all four sides with two or three tacks on a side. Slip-tacking consists in driving the tacks only part way in, so that they can be pulled out again if the goods is not at first sufficiently stretched. Slit the muslin diagonally from the corners to a point just inside of the legs. Some of these loose ends may be cut out. Tack the muslin permanently, folding the edges under, and working from the center toward the corners. When the corners are approached, fold the extra muslin under, keeping all smooth. The tacks should be about 1½″ apart. Four-ounce tacks are used for this purpose, altho 3 or even 2½ oz. are sufficiently large.

The outside cover is put on very much like the muslin. Slip-tack the centers of all sides first. Cut the corners diagonally and then trim so the cover fits closely up to the legs. Be very careful not to cut too far ,or the whole cover with be spoiled. Work the cover along thoroly with the left hand a number of times before placing each tack. Try for smoothness all around. Keep the tacks close to the edge of the

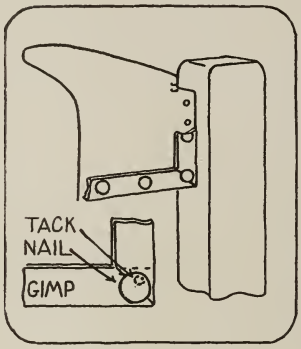


Fig. 10

cover, remembering that the gimp is only $\frac{1}{2}''$ wide and it must cover their heads. If the cover comes a little below the lower edge of the rails and folds up a little against the legs it does not matter, for it can be trimmed after it is tacked. Use a knife or chisel for this purpose.

Start the gimp at one of the lower corners, tacking it near the end with a 4 oz. tack. Stretch it across quite firmly to the other corner and tack with another tack in such a way that when the gimp is folded and started off at right angles the head of the tack will be covered by the fold and will not be in the way of the nail when that is put in. Continue the gimp along the leg and across the top to the inside corner of the leg where it is tacked and folded again. Fig. 10 illustrates the tacking, folding and nailing.

Continue the gimp all around the edges of the cover and tack at every turn until the last end overlaps the first. Fasten this end with a nail. Place nails at all the turns, then in the middle of all sides, then half way between the middle and turns. Continue this spacing and nailing till a sufficient number of nails are inserted. They should be about $1\frac{1}{2}''$ apart.

Fig. 11 shows different treatments of the same kind of work. The only difference is in the right-hand stool where the rolls are left off so that the gimp can be nailed on top of the rails.

CONCLUSION

Order of procedure in upholstering a footstool:

1. Rasp the inside edges or arrises of the rails.
2. Apply the webbing.
3. Apply the burlap.
4. Put the rolls on the top edges.
5. Fasten the corner blocks in place.
6. Pack with tow.
7. Put on the muslin.
8. Put on the Marokene or outside cover.
9. Tack on gimp.
10. Place nails.

The above work can be completed in about two and a half to three hours.

All the prices quoted above are wholesale prices. The retail prices vary so much in different localities and even in different places in the same locality that it would be worth very little to give them. The wholesale prices give some idea of what materials ought to sell for and will aid in checking quotations from retail firms.

FIG. 11

SIMPLE PROBLEMS IN APPLIED DESIGN FOR ART NEEDLEWORK

ADELAIDE MICKEL.

IF one believes that applied design is of more value to students than abstract design, it seems appropriate to select needlework as a field of design work for classes of girls. In such classes the following problems have been carried to completion with satisfaction to both student and teacher.

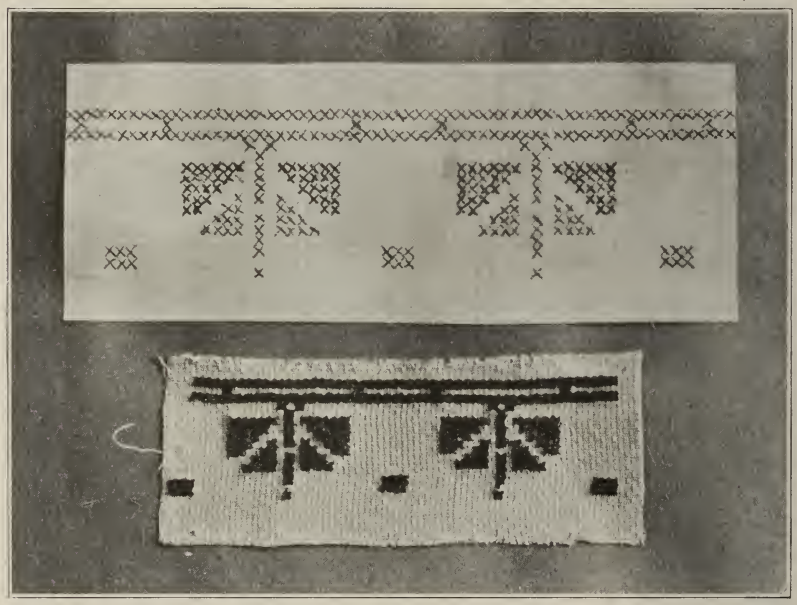


FIG 1

The first design was for a narrow border to be executed in cross-stitch embroidery on the ends of a guest towel. The method of procedure was as follows:

First, we laid off on sketch paper a surface of eighth-inch squares. Upon this we made our trial designs, using the square as our unit of measure for the cross-sitch. After having made a satisfactory design on this paper we drew it on coordinate paper, Fig. 1, using crayons that represented as nearly as possible the color of the embroidery cot-

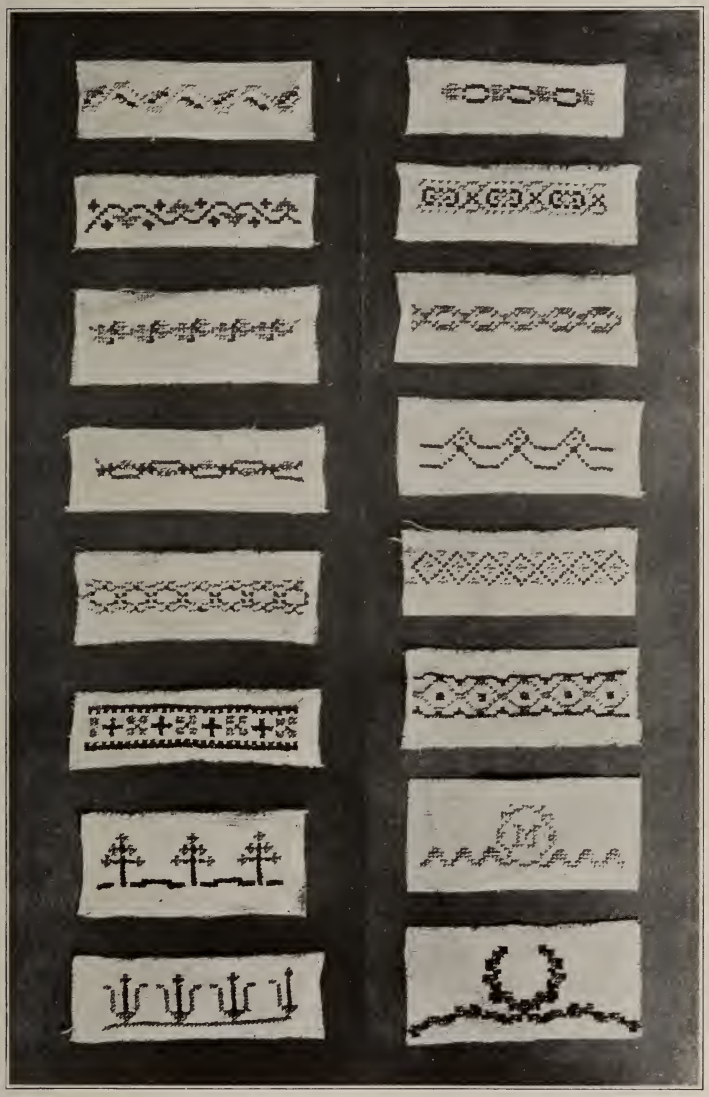


FIG. 2

ton that we were to use in the finished work. The selection of the embroidery cotton was utilized as a lesson in harmony of color.

The next step was to baste a strip of railroad canvas of the necessary width, on the huck toweling. This we use to assist us in keeping

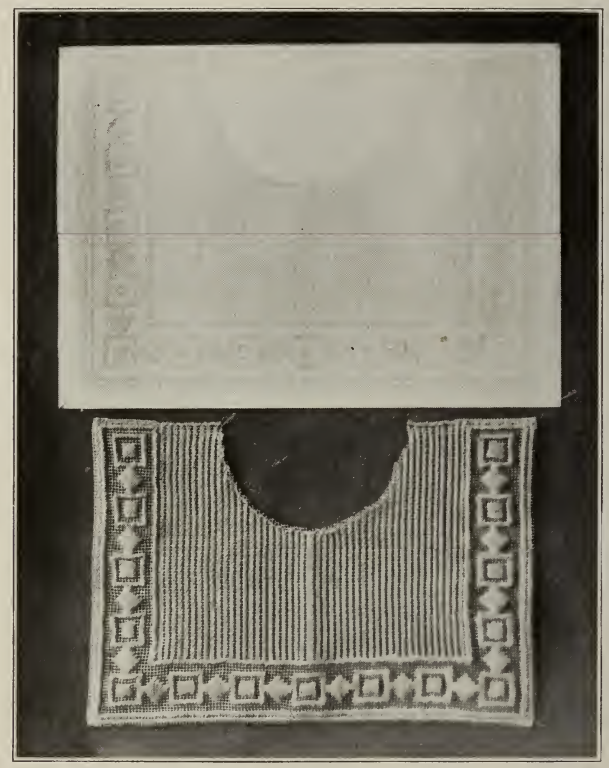


Fig. 3.

the stitches of an even length and also to keep the work straight on the toweling. We then proceeded to embroider the design on the toweling, using D. M. C. No. 16 embroidery cotton. In making the cross-stitch the upper or last stitch must always be in the same direction thruout a design. The time being limited, each student finished only a few repeats of her design, but enough to see how it would appear in the finished article, and as a guide for future effort.

It was discovered that designs for several other kinds of art needlework could be made, using the square for the measure of the unit. Designs to be used on fillet lace, suitable for collars, curtains and trimmings can be made by using the square for a unit of design. The collar shown in Fig. 3 was worked out by this method, using squares

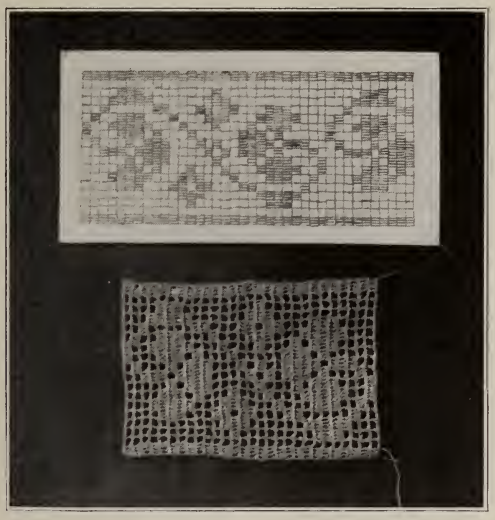


Fig. 4.

the same size as that of the lace, upon which the design was to be worked. This is important, otherwise the collar would not be of the desired size when finished. The stitches used in the collar are known as running stitches and the solid embroidery required two stitches in each hole.

The design for the fillet crochet lace, Fig. 4, was made in the same manner. We indicated by a heavy straight line the number of double crochet stitches that were to be used to make the square or unit. This design could be made only by students who had a knowledge of crochet.

Straight line designs to used on scrim or coarse linen, Fig. 5, are readily carried out if first drawn on squared paper, using water color or crayons to show the colors to be used. The square or unit of the design

is usually four stitches, taken over four threads of the goods; six or eight may be used if the design is to be very bold. Designs to be used on scrim or linen in this method of embroidery can show only horizontal, vertical, or diagonal lines at a 45 degree angle, because of the even weave of the goods.

Experience has shown that the interest in each problem has been greatly promoted when the students have been encouraged to carry out their designs. Moreover, the ability of the students has increased, especially in power to think more clearly and to realize the limitations of the material used.

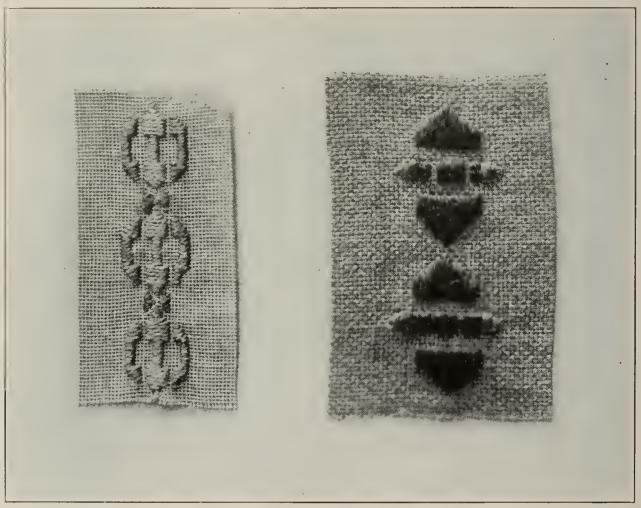


FIG. 5.

EDITORIAL

THOSE of us who are engaged in promoting and maintaining vocational instruction will necessarily have to bear in mind that the enactment of minimum wage laws will have considerable relationship to the educational program in which we are engaged.

The Minimum Wage Laws and Industrial Education.

At first glance, it would seem as tho the minimum wage law would have one effect—very likely more than one —but one effect surely will be the retention in service of only those employees who can render at least a service entitling them to the minimum wage prescribed by law. The law will compel employers to establish efficiency systems in their business and to take frequent account of their stocks of incompetents. It will compel society to establish vocational instruction making for manual intelligence and industrial skill. Whatever the final outcome of an attempt to legislate for wages, it is clear that such a venture will work hardship on a vast army of workers near the border line of incompetency who must show that they are producers, or at least earn their own "keep."

The following illustration possibly is not the best that might be taken, but it is the only one that now comes before the writer. We all know that in poultry breeding we have what is known as the "boarder." It is a hen which does not earn her keep. She lays perhaps fifty eggs a year. Now, why not have passed for her benefit a minimum egg law in which a certain number of eggs in addition to what she lays are to be placed in her nest each year from the State Egg Treasury. It would be a form of legislation for eggs. The wise poultryman, however, does not look for any such law. He attempts to increase the efficiency of his flock by careful breeding; by weeding out incompetents; by building up the laying efficiency of the individual hen; by balanced rations; warm, hygienic housing and individual care.

In the long run, legislating nest eggs of wages for industrial incompetents will be as unwise as for hens. Wage earners need better inheritance, better housing, better food, more effective education, more industrial opportunities for individual growth, and it is then, and then only, that human society may expect more eggs in the industrial basket. Society must always carry on its shoulders the "industrial boarder" so long as it neglects to train for industrial and social efficiency. This

efficiency will never be gained by legislating merely for the placing of eggs in the wage earner's pocketbook. Neither will it be gained by promoting only technical efficiency at the expense of contentment and mental breadth.

No one will deny that workers in many vocations are underpaid and over worked and that some are overpaid and underworked. But hours and wages are not the only elements which must be considered. The switchboard making for efficiency is complicated. There are the plugs of education, of health, of ideals, of justice, of citizenship, of wages, of skill, of hours, of industrial insurance, of workingmen's compensation laws, of collective bargaining, of open and closed shops and a score of other plugs, large and small, which confuse even the best of our social engineers. The minimum wage law is a new plug and it needs a connecting lead wire to the plug of higher efficiency of the worker. —ARTHUR D. DEAN.

A Community Inventory

In another place in this number will be found a brief account of the preparations that are being made for the annual convention of the National Society for the Promotion of Industrial Education, at which convention a considerable portion of the program is to deal with the results and recommendations of the Richmond industrial survey. This MAGAZINE has endeavored to keep its readers informed as to the progress of the work, so that it remains only to comment briefly on the methods used.

Without implying anything as to the competency of the persons employed to direct the survey, it is entirely appropriate to call attention to the fact that the Richmond authorities made every effort to provide the conditions for a scientific investigation. They sought advice in many different directions as to method of procedure, and, after full deliberation, entered into an agreement with the National Society in accordance with which the investigation was made on a cooperative basis. It must be said that the resulting conditions were unique in the history of surveys and investigations, and it is difficult to see how a more auspicious alignment of forces could be secured to back an enterprise of this character.

To Dr. Chandler, superintendent of the Richmond public schools, and the officials of the National Society must be credited the conception of a great idea when it was decided to attempt a survey that, in addition to pointing the way to the solution of local educational problems, might

serve other communities as a type or model study. All of this was important and commendable, but the original and almost startling proposal was to have the investigation precede the annual convention of the Society, and to offer its findings and conclusions, as well as its methods, for critical examination and discussion at the convention.

This feature of the plan required courage. It required courage on the part of the Richmond authorities, for they could not know in advance what the survey might bring forth. It required courage on the part of the Society, for its ability to carry so great and so complex an enterprise thru to successful accomplishment was yet to be demonstrated. And it required courage on the part of those individually responsible for the various departments of the investigation, since it is manifestly impossible to attain perfection in a piece of work of this kind, undertaken and completed, as it had to be, within a limited time.

What Will Come of it?

In the very nature of things there will be criticism. So much the better. Constructive criticism from those who can study the survey from the outside, with better perspective than those who have been too close to the work, is the one thing now lacking to complete it. This lack will be made up at the convention. The methods used will be closely examined; the data secured will be carefully scrutinized and checked up; the interpretations of data will be analyzed; the recommendations and proposals will be deliberately weighed in the balance with the results of actual experience elsewhere.

Quite independently of individual considerations, the outcome of the process is bound to be something worth while. Not only will Richmond secure for herself the best available expert advice as to procedure in dealing with the problems of vocational education that immediately concern her, but the plan and method of the survey, modified in the light of full and critical discussion, will be available for any other community for use in dealing with its own special situation. The belief that there is no such thing as general industrial education, and that specific programs must be based on intelligent understanding of the industries, is gaining ground. Much remains to be done, but a long step forward has been taken in formulating a method of procedure, and submitting it for criticism, discussion, and modification. Richmond deserves credit for having done a great public service in providing the conditions for the experiment. —WILLIAM T. BAWDEN.

Attitude of Corporation Schools

On another page in this issue we call attention to a recent report of a committee of the National Association of Cooperation Schools. We are glad to do this, because we believe that this Association is in a position to exert a very great influence upon vocational education in this country during the next few years. And we are especially glad to do it, because of the cordial attitude of the Association toward public education and its evident willingness to cooperate with public schools whenever that seems practicable. In a recent letter the assistant secretary and treasurer of the society, F. C. Henderschott, of the New York Edison Co., says,

> Our Association has come into existence not with the view of supplanting any forms of education or any established educational institutions, but with the hope of supplementing their work. It is not the purpose of any of the corporation schools to parallel educational courses given in the common or grammar school grades—that is, we believe the public school should have entire charge of the child until the age of fourteen or until graduation from the grammar school. Our efforts will be only to be of service in making the public schools more effective, a service too long neglected on the part of industry. Neither do we believe that the child should be taught any trade, or that the child should be shaped to fit into any specific industry until after graduation from the grammar school. We do believe, however, that possibly a knowledge of the industries and broad general cultural knowledge could be incorporated in the teachings of the child before the ages of twelve and fourteen.

Death of Inspector Corrodus

We have received from H. Williams Smith, of London, the following "appreciation" of Inspector Carrodus. We are pleased to publish it because we have long held Mr. Carrodus in high regard and we knew something of his personal power.

English manual training has experienced a great loss by the death of Mr. Samuel Carrodus, who passed away on September 20th, after an illness of three days duration. Mr. Carrodus was the senior inspector of manual training to the board of education, and his duties during the last three years have lain in the very important London area. Before becoming an inspector he was the principal of a provincial art school, and, strange to say, he had never actually taught manual training. This may have been a drawback to him, but it was never apparent. He was a born teacher and had the happiest of manners when he took a class in hand. He was a born inspector, also, and had as happy a manner with the teacher as with the boys. He was an enthusiast for handwork, but his was that most intense of enthusiasms which, under the curb of a dominent intellect, sway men and things. We were going to say that he was a man much bigger than his job, but when we think of what he accomplished, of the influence he exerted, and of the memories he leaves behind him, we prefer to say that he took a small subject in hand and left it a big one. He was respected by all, and loved by many. The post he has left vacant will be hard to fill.

OF CURRENT INTEREST

THE RICHMOND INDUSTRIAL SURVEY

THE work of the Richmond industrial survey, under the auspices of the National Society for the Promotion of Industrial Education, was practically completed early in October, and a preliminary report was considered at a special meeting of the survey committee, held in Richmond October 3rd. At this meeting the preparation of a synopsis of the report of the survey was authorized for distribution in advance of the annual convention. The purpose of issuing this synopsis is to enable those who attend the convention in Richmond, December 9 to 12, 1914, to have an intelligent understanding of the work and of the recommendations of the general survey committee, which will be presented for discussion at that time.

OBJECTS OF THE SURVEY

As has been previously reported in this MAGAZINE, the National Society has been the chief agency in the conduct of the survey, and has been responsible for the development of plans for cooperation. On the part of the Society the objects of the survey were: (1) To demonstrate the necessity of a knowledge of industrial and school conditions in the preparation of a program for the development of industrial education in a city; (2) To show the kind of facts about industry and about schools which need to be gathered; (3) To develop a method proved by experience for studying the industries and the schools for purposes of industrial education; (4) To secure the cooperation of local and national, public and private agencies in the making of a type survey, and to bring to bear upon the task the best expert service and advice that could be secured; (5) To make the annual convention of the Society more helpful to the convention city by focussing much of the discussion on its problems, and leaving with it not only information as to conditions and possibilities, but also wide discussion and expert advice thru the membership of the Society and others as to the development of industrial education in Richmond.

The purposes of the Richmond authorities in requesting the Society to undertake the survey were: (1) To make the annual convention

in Richmond most helpful to a city interested in providing practical education for its people; (2) To give the city a knowledge of the industrial and school facts and conditions upon which to base a program of industrial education, and to secure the best expert advice as to how to proceed, in order that, as one school official expressed it, "Richmond may not be working in the dark."

The agreement between the Richmond authorities and the Society provided for a general survey committee to have direct charge of the survey, and a local committee made up of citizens of Richmond to cooperate. The general committee consisted of : Leonard P. Ayres, Russell Sage Foundation, chairman; C. H. Verrill, U. S. Bureau of Labor Statistics; L. W. Hatch, New York State Bureau of Labor; J. A. C. Chandler, superintendent of the Richmond public schools; C. R. Richards, Cooper Union, New York; C. H. Winslow, U. S. Bureau of Labor Statistics; C. A. Prosser, secretary of the National Society.

The survey was planned in two parts: (1) A school survey, directed by Leonard P. Ayers; (2) An industrial survey, directed by Charles H. Winslow, assisted by Miss Cleo Murtland, assistant secretary of the Society, John Cummings, formerly statistician with the U. S. Census, and William T. Bawden, managing editor of this MAGAZINE.

FACTS ABOUT RICHMOND

The preliminary report presents the salient facts about Richmond, which is the capital of Virginia, and situated in the eastern part of the state, at the head of navigation on the James River. Richmond is a rapidly growing, manufacturing center, with a population, estimated by the Census for 1914, of 134,917. The population is massed in a relatively small area. Only 6 of the 47 large cities covered by the Census data of 1910 regarding area and population reported a population per acre within the city limits as great as that of Richmond, all of these six cities having more than 300,000 inhabitants. Richmond thus possesses a distinct advantage over those cities whose industrial establishments are more widely scattered and necessarily more remote from any school center.

The problem is primarily one of training a native population, since less than four of every 100 of Richmond's inhabitants were foreign born. About 70 per cent of the native wage-earners were born in Richmond, and about 86 per cent in Virginia. More than one-third of the in-

habitants are negroes, tho this proportion has been slowly decreasing during the last 30 years. With the exception of Memphis and Birmingham, Richmond has a larger proportion of negro population than any other southern city.

SCHOOL ATTENDANCE NOT COMPULSORY

Previous to 1914 a child could not legally enter the public schools of Richmond under 7 years of age. This explains, in part at least, the comparatively low percentage of school attendance in Richmond and and other southern cities when contrasted with those of cities in other states. Undoubtedly the absence of any compulsory attendance regulations causes much poor and irregular attendance, from which the records of cities where children are required to attend school do not suffer. No other city of more than 100,000 population had in 1909-10 so small a proportion of its population between 6 and 21 years of age in school.

The education problem of Richmond is unique, (1) because of the large proportion of native and of native parentage in the white population, and (2) because of the large proportion of negroes in the total population. Richmond is not confronted with the task of assimilating a large foreign element, but rather with that of training its native population for industrial efficiency.

SCOPE OF THE SURVEY

Tables are presented giving the distribution of wage-earners according to occupation, sex, and color. The scope of the survey included a study of the following: 30 occupations in the metal trades, 26 occupations in the printing trades, 35 occupations in the building and woodworking trades, 18 occupations in the tobacco industry, besides the department stores. These occupations represent over 15,000 workers.

METHOD OF INDUSTRIAL SURVEY

Interviews were held with employers and groups of employers to explain the purpose of the survey, and of the questionnaires used, and to secure their cooperation. The employers' schedules were usually filled out thru personal interviews. There were also numerous interviews with individual workers and groups of workers at their places of em-

ployment or at their organization meeting places, for the same purposes as the corresponding interviews with employers. Individual schedules were secured from 509 workers, each representing a personal conference of about 20 minutes. Many visits were made to shops and factories by field agents to study industrial processes and conditions, and numerous conferences were held with men and organizations familiar with the industrial and commercial conditions in Richmond. All findings based on the data collected were submitted to employers and workers for criticism and approval.

Occupations were studied by trade groups, and a complete analysis of each occupation prepared. This analysis is presented for each trade in condensed form in a chart, and in full in the text. The chart is arranged in two parts: (1) Facts about the occupation, and (2) Facts about education for the education. These charts have been printed for distribution with the preliminary synopsis.

STUDIES OF INDIVIDUAL WORKERS

In addition to the descriptive and tabular analysis of the occupations, the complete report will contain a great deal of statistical data about the occupations, gathered chiefly from the individual schedules which were secured from 509 workers in the printing, building, and metal trades. Lack of space forbids more than a brief reference to a few of the points brought out.

So far as this investigation has gone, it appears that there are no children under 14 years of age employed in the printing, building, and metal trades, and there are comparatively few apprentices in these trades. More than half of the workers have received in Richmond whatever training they have had, and about three-fourths of them in Virginia. Not only is there relatively very little moving about from place to place, but there is very little shifting about from occupation to occupation. About 42 per cent of the workers in these trades have been in their present occupations from 6 to 15 years, and two-thirds have never been in any other occupation than their present one.

Practically none of the workers in these trades became wage-earners before the age of 14; about seven-eighths of them began to work after reaching 15 years of age; more than one-half entered employment after 15 and under 18 years of age.

Richmond workers come from the elementary schools. The typical

mechanic in these trades has had less than 7 years of schooling, 80 per cent having received not more than 7 years of any sort of schooling. Only 6 out of 509 had received as much as 11 years of schooling, and none more than that. Much of this school attendance was in ungraded classes in rural districts. More than 60 per cent of these workers reported that progress in their trades is or has been impeded by lack of education. Many of these reported having attempted correspondence. and night school courses in the hope of making up deficiencies.

Approximately 50 subjects for evening or continuation school instruction were suggested by these workers to help them in their present occupations. The subjects asked for range all the way from such elementary school work as reading, writing, spelling, and arithmetic, to such practical work as shop mathematics, mechanical drawing, plumbing and steam-fitting, and gas engineering. In the printing trades the characteristic demand was for the trade chemistry, design, color harmony, and ink mixing. In the building trades mechanical and architectural drawing, shop mathematics, and estimating were asked for. In the metal trades the characteristic demand in much larger proportion was for shop mathematics, mechanical drawing, and arithmetic.

In a similar way the data collected on the employers' schedules is analyzed, and presented in condensed form; but it is impossible to reproduce any of it here. Copies of the bulletin containing the synopsis and preliminary report of the survey, ready about Nov. 15, may be obtained at the office of the National Society for the Promotion of Industrial Education, 140 West 42nd Street, New York, N. Y., or from the U. S. Bureau of Education, Washington, D. C.

THE VOCATIONAL SURVEY IN NEW ORLEANS

New Orleans has received a gift of $800,000 for the erection of a free public trade school where boys of the grammar grades can be taught a trade. It will be a lasting tribute to the life of Isaac Delgado, causing him to be remembered as the first giver of a large sum of money to New Orleans for vocational education. He evidently saw the great need of thousands of boys who yearly leave the grammar grades utterly unprepared for earning a livelihood, immature, destined therefore to failure. Mr. Delgado expressed the wish in his will that the entire amount of his bequest be used for the erection and equipment of the school and that the city of New Orleans provide for its maintenance.

The city is unable, at present, to make the necessary appropriation for this purpose, consequently the school board has made application to the state legislature for an appropriation for industrial education. It has been granted an appropriation of $10,000 annually for each of the next two years. (This, by the way, is the first appropriation made by the legislature to the city of New Orleans, or to any other city in the state for industrial education.) The $10,000 appropriation is not enough for the up-keep of the proposed school, and for the other demands from industrial education thruout the city, so the erection of the school is temporarily delayed. But more help is hoped for from the state legislature, and some from the federal government. This delay, however, has given time for a careful preparation for the planning of such a school. "It would have been simple to buy land, erect imposing buildings, select teachers from scores of applicants, and then call the result a trade school. In a community where no trade school exists and where, as concerns trade schools, there are practically no men with thoro training or experience in organization and erection of trade schools, nor teachers with both practical and theoretical preparation in trade school work, such a course inevitably would entail the loss of thousands of dollars and, educationally, the plant would have been a sham, however imposing the edifices." Therefore a personal investigation has been made of the best city trade schools of this country, and a careful study of those in Europe, and also a vocational survey of the grammar schools and industries of New Orleans, so that the industrial needs of the city may be met by the Delgado School. A report of this investigation and survey has been written by Dr. David Spence Hill, professor of education, Sophie Newcomb College, and director of the survey. The report was published by the Commission Council, New Orleans, June, 1914.

The work of the survey began with an investigation of the grammar schools in regard to enrollment, elimination, progress and repeating grades. This brought out the startling fact that each year over 2,000 children drop out of the grammar grades, usually to go to work, as soon as they have reached the age limit; that three-quarters of the thirteen-year-old boys are below the seventh grade, more than one-half being in, or below, the fifth grade, and a large proportion of the negro boys go no further than the first grade, while practically none stay in school after the fourth. This means that these children are leaving school without a common school education and without a proper direction toward a suitable vocation. Special study was made of the thirteen-

year-old boy as to distribution in the grades, as a delinquent, as to where born, teachers' impression of his aptitude for work, and also the occupations of the fathers of this group of boys. This data for this last subject showed a significant fact for industrial education, namely, that an unusually small per cent of men are engaged in manufacturing in New Orleans, as compared to other cities that have been investigated in this particular, while an exceptionally large per cent are in "service"—government, professional, domestic, and personal.

Since many of those who have left school before completing the eight grades are now in the night schools, these schools were another field for survey. The method used was the distributing of blanks among the 1,472 men and boys in these schools. On these, they gave facts concerning the age and grade that they left school, the number and kind of "jobs" they have had and how long they were in each; the same for their present occupation; and the occupations in which they wish to be. These blanks, tho nothing but ink and paper, on the face of them, are full of the human element. They touch one's imagination and make him wonder what has aroused the ambition of a fourteen-year-old boy who has painted signs to want to become a lawyer, or one who has been an errand boy and "water boy" to become an engineer, or another who has plied the boot-black trade and run errands to desire to be a railway mail clerk, or an office boy to be an electrician. The largest group, more than 500, wanted to be mechanics, engineers, electricians, plumbers or carpenters. The next largest group, one of 300 wanted clerical positions.

Dr. Hill visited 90 local factories or industries, when investigating this field, collecting data concerning occupations, processes, number and wages of workers. He also sent a questionaire to the New Orleans employers to learn the attitude toward vocational schools. About 50 per cent were in favor of them, 45 per cent were either silent or doubtful, while 5 per cent did not approve of such schools.

Future numbers of studies, of which Dr. Hill's report is the first number and introduction, will contain further data bearing upon the establishment of the Isaac Delgado Trades School. Data are being gathered concerning "Industries in New Orleans," "Buildings, equipment and organization of the best trades schools in other cities," and "Special problems concerning vocational and trade education in New Orleans."

THE CHANGING DEMANDS UPON TEACHERS OF THE MANUAL ARTS

A recent letter from J. I. Billman, manager of the Education Department of the Western Reference and Bond Association of Kansas City, gives the experience and point of view of a man whose business it is to find teachers for positions and positions for teachers. From his statement we learn:

1. That in his experience nearly one-sixth of the total demand for teachers during the past season has been in the field of the Manual Arts.

2. That about one-fourth of the manual arts teachers must give instruction in other branches also. In a large number of cases the teacher of manual arts must be able to coach athletic teams.

3. That in many instances, and especially in the county high schools of the Northwest, the demand is coming for men with broad practical preparation. The school officials want teachers who can give instruction in forging and tempering farm tools, ordinary welding, mixing and testing concrete, repairing buildings and making ladders, singletrees, farm gates, etc. They want the pupils to receive instruction in the most practical of farm problems in tool work. Taborets and towel-racks and hat-racks have pleased the women folks, but now the men are coming forward with their demands.

4. That the demand is increasing for teachers of the manual arts and vocational subjects who have completed a teacher's course in some standard institution, and that in the near future it will be difficult "to place any man in a good school unless he has completed a full course and holds a degree."

5. That "practically every superintendent objects to teachers who use tobacco. For this reason eight or ten men, although otherwise qualified, could not be placed."

6. That already in the case of teachers of the household arts "there are but few good positions open to other than graduates of standard colleges." This year his records show that over "85 per cent of all requests for teachers in this line of work specify 'graduate of a standard college."

Several of the above observations were in harmony with the following statement recently sent out from Bradley Institute:

> The demand for teachers of the manual arts during the past two years has been stronger than ever before, and a noticeable fact about that demand is, that a much greater variety of teachers and supervisors are wanted. Besides the

usual teachers of woodworking, pattern-making, forging, machine shop, etc., there are requests for practical electricians, printers, men to teach the running and care of gasoline engines and automobiles, teachers of continuation schools, men to teach the drawing of plans for farm buildings, teachers of agriculture and woodworking or blacksmithing or both, suited to farm communities. From these requests it is clear that the demand is growing stronger and stronger for men of practical experience, but usually there is little or no willingess to take teachers with lower academic standard of preparation. Superintendents usually want both, which is usually impossible to get in full measure.

MORE INDUSTRIAL WORKERS TAKING COURSES FOR TEACHERS

A recent investigation of the source of men students entering Bradley Institute to prepare for teaching has revealed the following facts concerning the 80 students who have been pursuing courses during the two years 1912-13 and 1913-14 (not including summer school students).

12 came with full trade preparation
16 came with partial trade preparation
6 same directly from teaching
10 came from technical high schools
2 came from art schools
34 came from other high schools and normal schools.

80

A further analysis of the first item shows that 2 of the 12 were electricians, 2 pattern-makers, 2 draftsmen, 1 a cabinet maker, 1 a carpenter, 1 a machinist, 1 a machine woodworker, 1 a bookkeeper, and 1 a pharmacist. A similar analysis of the second item shows that the practical experience of the 16 men was in the following lines: 2 in machine shop, 2 in planing mill, 2 in general woodworking factory, 1 in furniture factory, 1 in house carpentry, 1 in blacksmith and carriage shop, 1 in carriage paint shop, 1 in automobile garage, 1 in lumber business, 1 in printing, 1 in drafting, 1 as salesman, 1 as jeweler's helper.

MECHANICS TO BECOME TEACHERS

Two years ago at the meeting of the National Society for the Promotion of Industrial Education, in Philadelphia, Charles R. Allen outlined a plan for an evening course to train teachers for vocational schools. The course was to be for those men who have mastered a trade, and are working at it thru the day and have had at least a grammar school education. The stress, consequently, was put on methods of

teaching in vocational schools. A plan following Mr. Allen's ideas was carried out last year at Pratt Institute, Brooklyn, N. Y. The work began with an evening class to train young men to become teachers of shopwork in either day or evening industrial schools. Wesley A. O'Leary was the instructor. The class was composed of seventeen men, who worked at various trades thru the day. It was required that the men should have thoro trade knowledge and skill, consequently the instruction given was confined to the principles of teaching. An opportunity was given for practice teaching in the New York evening schools, one evening a week, and more, if the student desired. The class is continued this year, but with the following changes: an even more rigid selection of men is made, a greater variety of trades is represented by them; the subject matter is so analyzed as to reduce it to small units suitable for teaching purposes; and shop methods are contrasted with teaching methods.

Recently the state board of education of Massachusetts has decided to establish five schools, namely, at New Bedford, Lowell, Boston, Worcester and Springfield, having no tuition and substantially like the vocational normal school at Pratt Institute. At first these schools will accomodate but fifteen men each. The criterion for selecting men of certain trades will be the probable kind of teachers in demand for the different vocational schools of the state.

The first of these schools is now established in the vocational school building in Springfield, under the direction of E. E. MacNary, principal of the vocational school, and supervisor of the manual training in the city schools. Mr. Allen, representing the state board of education, went to Springfield to cooperate with Mr. MacNary in organizing this school. As to trades, the men selected are as follows, 3 mechanics, 3 patternmakers, 2 house carpenters, 1 steam engineer, 1 sheet-metal worker and 1 paper hanger and decorator. After a year of class training an opportunity will be given to as many students as possible to become salaried assistant teachers for another year in some evening trade school.

A school established for the same purpose in Milwaukee by the University of Wisconsin is taking another step forward this year. In carrying on this work Professor Crawshaw has secured the assistance of Wilson H. Henderson, director of vocational education, Hammond, Ind., and one of the editors of the *Industrial Arts Magazine*. Mr. Henderson has been given the title of assistant professor of industrial education. He will live in Milwaukee and devote himself chiefly to the

solution of the problems of training mechanics to become successful teachers.

THE NATIONAL ASSOCIATION OF COOPERATION SCHOOLS

The National Association of Cooperation Schools has just issued the report made to its executive committee by the sub-committee on the scope of activities for 1914-15. The report is written from two standpoints, namely,

1. The information expected of the Association, as shown thru correspondence with industrial corporations. This consists of data concerning the subjects that should be taught. For this reason the sub-committee recommends "that syllabi of courses be prepared by each of the committees on special types of schools."

2. The past work of the Association and the recommendations of the various committees.

The committee on public education recommended:

1. That an investigation be made to ascertain to what extent industries are cooperating with public schools.
2. That a compilation be made of the experience of these corporations.
3. That the committee consider in what additional ways the public schools and industries can cooperate.
4. That the committee give special attention to the collection of data concerning the experiences of industries that have shown the public schools to be particularly weak in fitting persons for industrial life.
5. That the committee ascertain to what extent industries find it necessary to duplicate the educational work of the public schools and that the committee investigate whether the public schools are willing to conduct courses for, or in connection with industries to supply this deficiency.

In the judgment of the sub-committee all corporation schools should include instruction in health. It is also the judgment of the sub-committee that a proper system of employment, including vocational guidance, should be connected with corporation school systems.

SCHOOL BUILDINGS CONSTRUCTED BY SCHOOL BOYS

The recent report of J. C. Wright, the director of vocational and manual training instruction in Kansas City, Mo., gives in detail the facts concerning the construction of five temporary school buildings by

school boys during the past summer. The accompanying illustrations suggest the character of these structures. In addition to these one toilet

SCHOOL BUILDING IN KANSAS CITY BUILT BY STUDENTS

building was constructed, and an out-building was remodeled. In his report Mr. Wright says,

> In these classes fifty-two different boys were enrolled, ranging in age from 14 to 19 years, with an average of 15.15 years. The amount paid the boys in wages per hour at the beginning was made lower than what should have been paid. We estimated the sum for which we could have employed regular carpenter labor and constructed these buildings. This sum was between $600 and $700. Later we found that the boys were making greater progress than we had expected in the beginning and therefore raised their wages accordingly, so that in the end the amount paid for carpentry work, including the wages of the teachers, varied on four of these buildings from $463.88 to $545.

In the construction of one of these buildings the boys were selected from two groups of boys who had been working on other buildings. They had, therefore, the experience gained in erecting one building. The average time for the first buildings was about 2450 hours each while the selected group completed a building in 1608 hours, a trifle less than two-thirds of the time consumed in the first.

The entire summer's work was regarded as a success. It was certainly profitable for the boys, both from the instruction gained and from

a monetary standpoint. The boys were paid from 10 cents to 25 cents an hour for their work, the average being 15.15 cents.

SCHOOL BUILDING IN KANSAS CITY BUILT BY STUDENTS

CHANGES IN PHILADELPHIA

A big problem is receiving a big answer in Philadelphia this year. Now that twelve new shops are being added to the thirty that the city already possessed, 11,141 seventh and eighth grade boys are to have one-half day a week of industrial training. John C. Frazee, director of the new department of vocational education and guidance, thinks that seven more such shops will give every seventh and eighth grade boy a like opportunity. There are many indications that the seven shops will soon be added.

Besides the problem of the seventh and eighth grade boy, Mr. Frazee is working on that of the 16,000 overaged children that are each year in the city elementary schools, but who, as statistics show, drop out of school as soon as the law allows. This problem is an urgent one, for these 16,000 children are one-third of the number enrolled, and what is more, this condition is typical of most of our American cities. He suggests that those between the ages of twelve and fourteen be given elementary industrial work, to be followed in the next two years by vocational training.

Mr. Frazee is doing pioneer work also in organizing and planning

the curriculum for the Philadelphia evening school that is to train men to become vocational instructors.

PART-TIME SCHOOL WORK AT YORK, PA.

The high school of York, Pa., commenced, in September, 1911, a cooperative industrial course for the machinists' trade, following the "Fitchburg plan." Stanley A. Zweible was made the supervisor. Eighty boys were placed with the cooperating firms. The character of the opportunities provided thru this may be gaged, somewhat by the following list of firms: The A. B. Farquhar Co., farm machinery and implement plant; The Martin Carriage Works; The Pullman Motor Car Company; The S. Morgan Co., manufacturers of hydraulic turbines and their accessories; The York Safe and Lock Co.; The Weaver Organ & Piano Co., and the York Ice-making and Refrigerating Machine Manufacturing Co.

The first year of the course is spent wholly in school; the theory of shop practice is studied. The other three years are spent half in school and half in the shop. The vacations are spent in the shop, except two weeks in the summer. An accurate record is kept of the kind of work performed in the shop by each student. By means of this the supervisor assists the foremen in advancing the students in the shopwork, so that they gain experience in the fundamental operations of the trade. Nearly every shop involved, has taken some steps for the systematic instruction of the boys. Some shops set aside certain machines and assign certain classes of work, keeping the boys at that work a specified time and then advancing them. An auxiliary shop, for the high school has been built this year. Here instruction is given in such practical phases of the shopwork as are needed to round out the instruction received from the foremen in the large shops. Here also each student will learn some things about the trades, other than his own. The academic work is closely related to the practical. The boys receive from the manufacturer from seven to fifteen cents an hour, for work done in the shops. It is interesting to note that the total amount earned by the students since the course began is $22,493.51. The amount earned last year was $10,591.02—three times the amount used to operate the industrial department.

VOCATIONAL EXPERIMENTAL SCHOOLS IN NEW YORK CITY

The board of education in New York City has recently authorized the establishment of at least six vocational experimental schools, making

an appropriation of $85,000 for the purpose. These schools are to be in Manhattan, Brooklyn and Queens. School buildings now standing are to be remodeled to suit the new regime which follows the plan of the elementary schools in Gary, Indiana.

The plan provides for two school organizations in one building, to be designated as X and Y. A number of classrooms in each building are to be converted into shops. For instance, a forty-eight-room school building will be split into thirty-six classrooms and twelve shops, so that, under the new plan of double organizations, a school, instead of accommodating forty-eight classes, will provide accommodations for twice thirty-six classes. The two school units will use the classrooms and shops alternately.

The board of education also authorized the board of superintendents to put into effect a system of continuation schooling in cooperation with the Baltimore and Ohio Railroad. Two continuation classes will be organized in the shops of the railroad at Clifton, S. I., where employees will be allowed to attend afternoons without loss of pay. The board of education will furnish the supplies and the materials and the teachers. The latter will be paid $1.50 for each hour of service.

The board has also authorized the opening of continuation classes in the department store of R. H. Macy & Co. There the girls will be taught common branches from 9 to 11 a. m. six days a week, without loss of pay.

A NEW PREPARATION COURSE AT THE RANKEN SCHOOL

With the opening of the school year on September 8, the David Ranken School, St. Louis, started a new department, called the preparatory division, for boys between fourteen and fifteen. The purpose of this division is to provide the younger boys with a year of general instruction before specializing in any given trade. The shopwork consists of work in wood and metal with the idea of training the pupil to know these materials and to handle properly the carpenter's saw, hammer, and chisel, the tinner's snips and soldering iron, the machinists's chisel and file, etc. Fully half of each day is devoted to work in the shop, and the remainder to drafting, mathematics, and English. It is believed that a year of this instruction will give the boy a more reasonable basis for his choice of a trade and will enable him to learn his trade more effectively after he has chosen it. The class has a capacity of twenty. Nineteen students are now enrolled for the work.

SHOP NOTES AND PROBLEMS

ALBERT F. SIEPERT, Editor[1]

A DRESSER SET

This dresser set is intended to be made of the same material as the dresser itself. Mahogany has given very good results and has been used many times because many dressers are made of that wood. Red gum with a light brown stain gives a very good imitation of Circassian walnut. Cherry works easily and finishes nicely. However, almost every kind of wood, if the workmanship be good, will stain and finish well.

The comb and brush tray is first roughed out, after which the inside is finished. This requires very accurate work with the gouge and chisel. Gouge out to the required depth, smooth with a chisel and finish with sandpaper. The work may be materially lessened if a Forstner bit is used to bore holes in several places to the required depth. After the inside is finished, complete the outside and polish. Finally, glue small pieces of felt under the corners.

The stock for the picture frame is roughed out and then glued to a block of 1 in. wood, preferably soft pine. Place the block on the screw-center face-plate and turn the back of the frame first. When turning this part of the frame, note the double step, one for the glass and picture, and the other for the circular back. After finishing and sandpapering the back, cut the frame from the block, make a pin chuck and turn the front. The circular back can be cut from a thin piece of stock with a coping saw, or turned. The rest is fastened to the back by means of a small strip of No. 24 sheet brass.

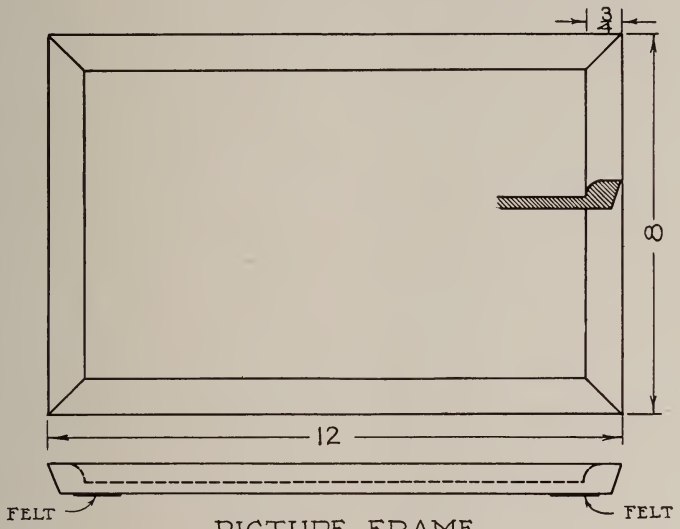
Glue the stock for the pin tray to a 1 in. block of soft pine. Place on a screw-center face-plate and turn to the desired shape. The whole tray can be completed without removing, with the exception of the base, which can be smoothed and covered with felt after the tray is cut from the block.

—W. R. HULL, Pittsburg, Pa.

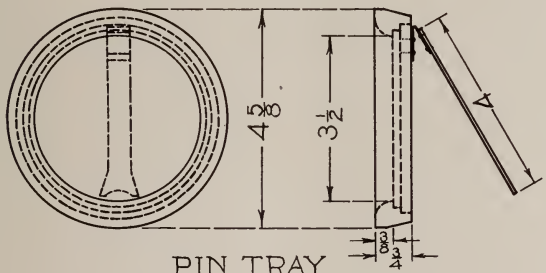
[1]Material intended for this department should be sent to the Editor at Bradley Polytechnic Institute, Peoria, Ill. Drawings reproduce best if made with black ink on white paper. Problems which require a full page should have border lines measuring eight by thirteen inches, smaller projects may be eight inches in length by whatever width is necessary. The most desirable photographs give single projects rather than a group, and are taken with neutral backgrounds. Prints having a glossy surface give the clearest halftones. The drawings and illustrations in this issue are good examples of these points.

A DRESSER SET

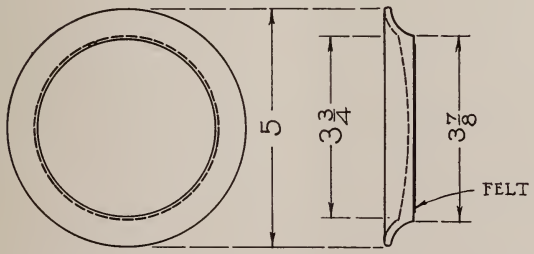
COMB AND BRUSH TRAY

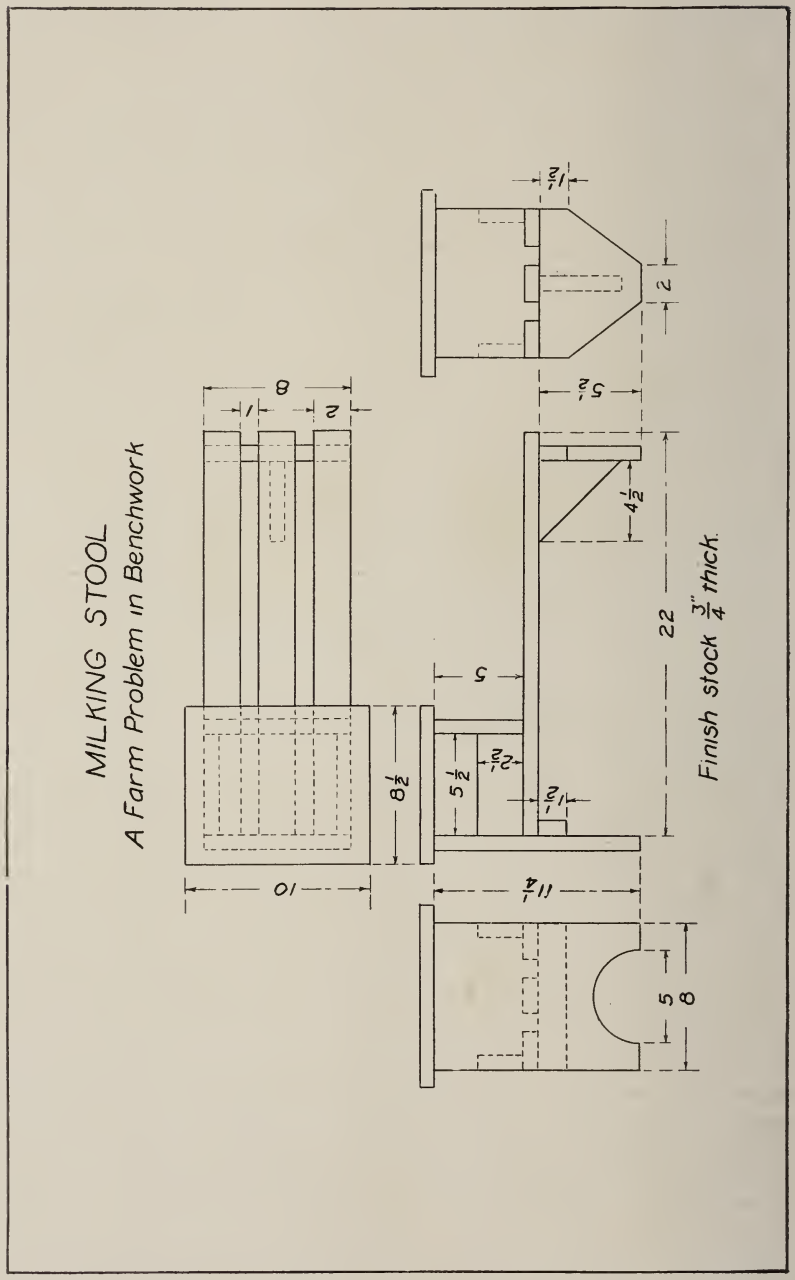


PICTURE FRAME



PIN TRAY




MILKING STOOL
A Farm Problem in Benchwork
Finish stock 3/4" thick.
8
1
2
10
8 1/2
5
5 1/2
2 1/2
1/2
11 1/4
22
4 1/2
5 1/2
1 1/2
2
5
8

MILKING STOOL

This problem has been used successfully as a project in short course classes for rural boys, and for pupils from the country attending school in town. It is an article that is used on every farm, and appeals to the average rural boy. Boys who have made these stools and taken them home, report that the provision for supporting the pail is commendable and is much better than holding the weight of the pail of milk between the knees.

The stock may consist of pine or any soft wood. The work includes the process of stock cutting, squaring up the pieces to an exact size, curve sawing, working three sided pieces, and fastening with screws and nails.

After working the pieces to size, the curve and oblique shapes shown in the drawing may be laid out and cut. After this the work of assembling may be undertaken. This project may be put together entirely with nails, but since screws in some places are more secure and neater in appearance than clinched nails, it is better to use 1¼ in. screws. The following order of assembling has been found efficient: (1) Attach cleat to back piece with screws. (2) Attach the long pieces to the cleat with sixpenny nails. (3) Attach the front support to the long piece with screws. (4) Put in corner braces and fasten with screws. (5) Attach the seat support with nails from below and from the front into the side pieces. (6) Attach the seat with screws.

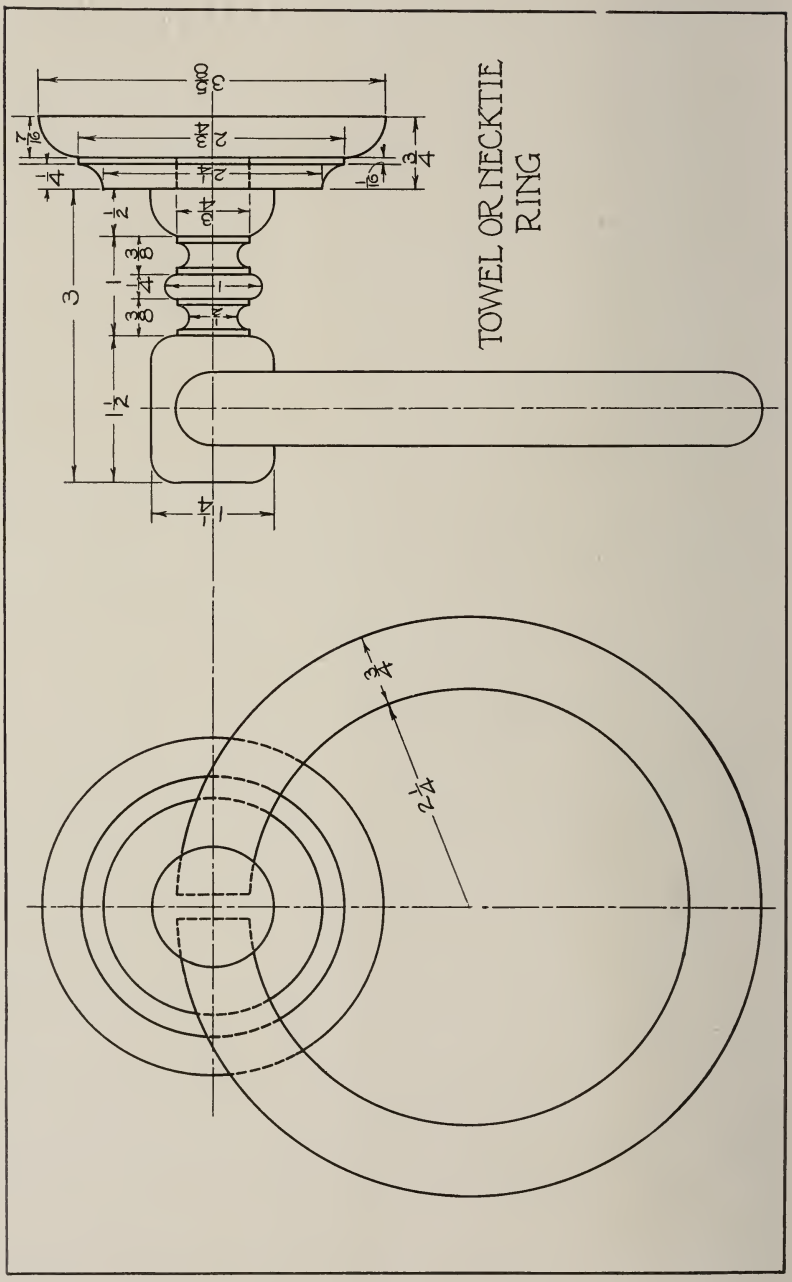
—Clay C. Curran, Glencoe, Minn.

SURFACE SPEED FOR SPEED LATHE WORK

The surface or cutting speed for work of different diameters should be constant. By means of experimental tests a constant speed of 18,000 inches per minute has been found most satisfactory and is the one recommended. This is easily maintained on a motor head lathe, but for belt driven lathes this can only be approximated. On the ordinary belt driven lathe but three or at the most four, variations are possible. Where the lathe is already installed the "common sense" method of regulating speed is to use the largest step of the cone pulley, or slowest speed, for work as large or nearly as large as the lathe will hold; the medium step for medium sized pieces; and the smallest step, or fastest speed, for smaller work.

Where the lathe is being installed, a spindle speed of 2,000 revolutions per minute, with the belt on the smallest step, will be found satisfactory. The stock, up to 2¾ inches, can be turned with a surface speed not exceeding 17,300 inches per minute. With the belt on the largest step, work from 5 to 8 inches may be turned with a surface speed not exceeding 17,500 inches per minute. These figures are based upon a cone whose steps give 2,000, 1,100 and 700 revolutions per minute.

—E. A. Johnson, Bradley Institute.


TOWEL OR NECKTIE
RING
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2
1/4
1/2
3/8
1
3/4
1/2
3
3/4
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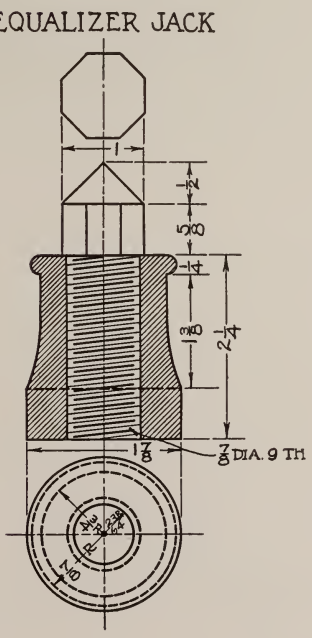
TOWEL OR NECKTIE RING

This problem in turning was contributed by M. A. Neudecker of Jackson, Minn. It involves a number of familiar turning processes, such as spindle, faceplate and chuck turning which makes it a splendid review or test problem as well as one interesting to the student.

EQUALIZER JACK

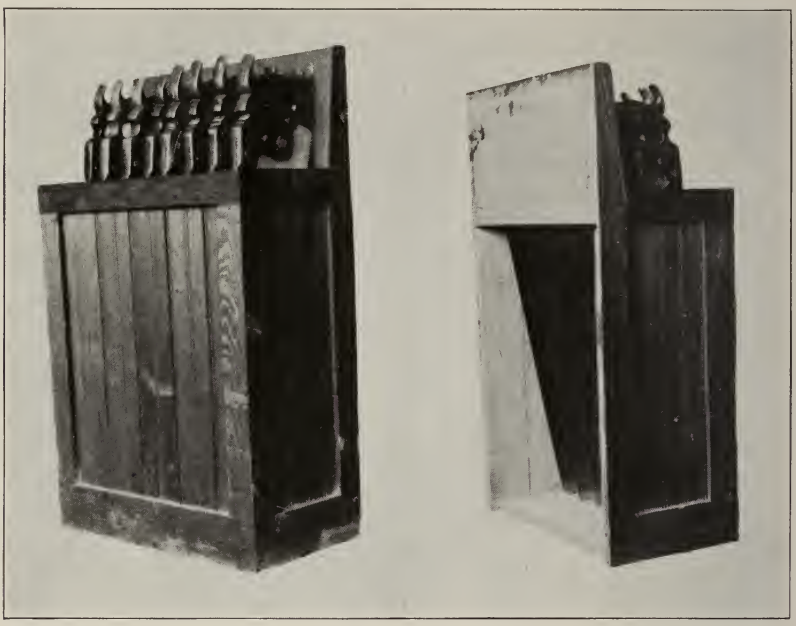
A new problem for machine shop students, who are mastering the earlier operations upon an engine lathe, is suggested by B. F. Hazzard of the Peoria Manual Training High School. This jack finds its largest use in locomotive repair work in jacking up the springs. It is commonly made in sets of three, 1½″, 2″ and 3″ or 4″ high, which permits the load to be raised by the smaller jack until the next larger may be inserted.

EQUALIZER JACK



HAND SAW CASE

The problem of keeping saws in a small space where they are accessible, yet safe from injury is solved by Chas. C. Stoker of the Canton, O., schools by the case shown in the accompanying illustrations. In one view the back has been removed to show the construction. The top is solid, kerfs having been made to receive the saw blades.



COSTUMER

The Costumer is an eighth grade problem. The base involves form work, the making of like pieces, and a middle lap joint. The brackets and pegs involve the making of like pieces also, and necessitate exact work.

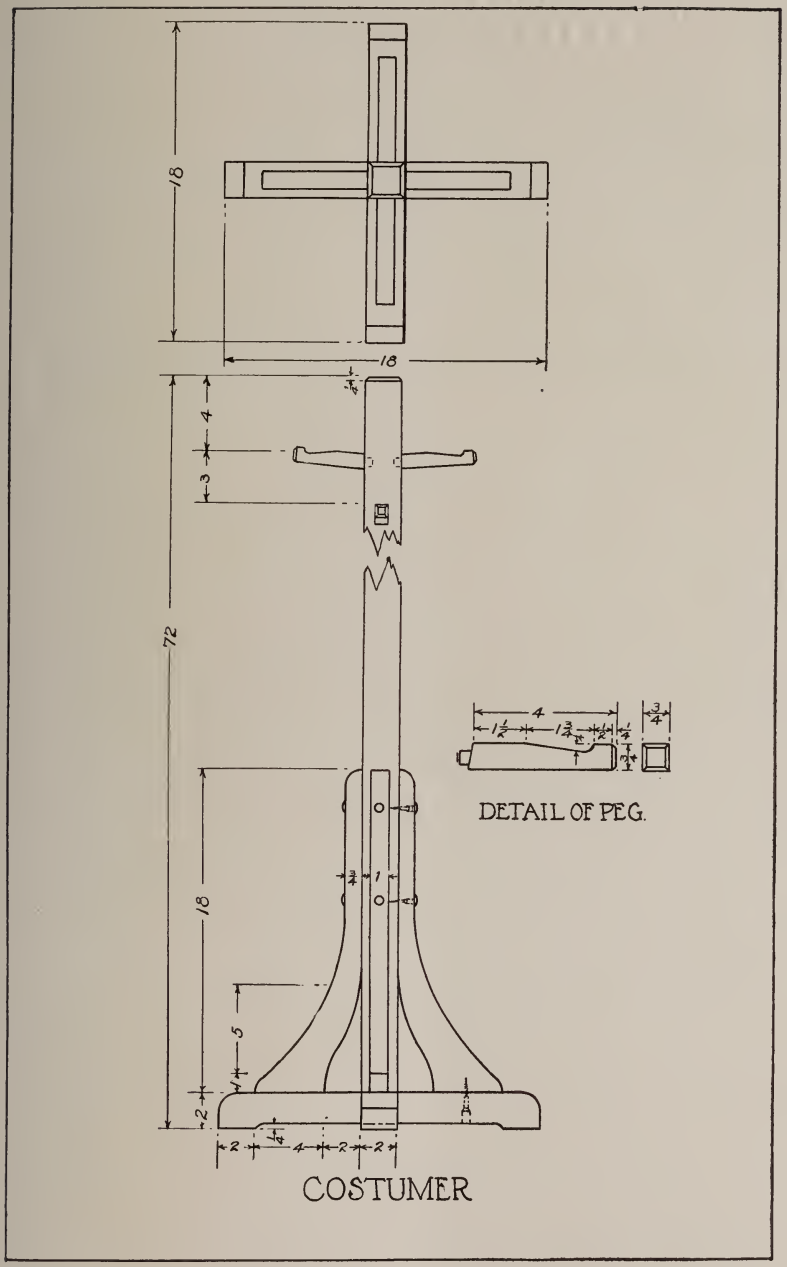
The brackets may be fastened to the uprights by means of either nails or screws. In case screws are used they may be countersunk and the holes capped. Caps are found in the market from one-fourth to three-fourths of an inch in diameter, and really add to the problem a decorative effect.

The upright is held rigid by means of a lag screw, supplemented by the screws from the base into the four brackets.

The pegs are fastened to the upright by means of the mortise-and-tenon joint. Note that the shoulder of each is cut at a slant to give the necessary up tilt to the pegs.

Any material may be used in the construction of the problem. We have found oak, red gum, and poplar very satisfactory.

—L. D. Perry, Joliet, Ill.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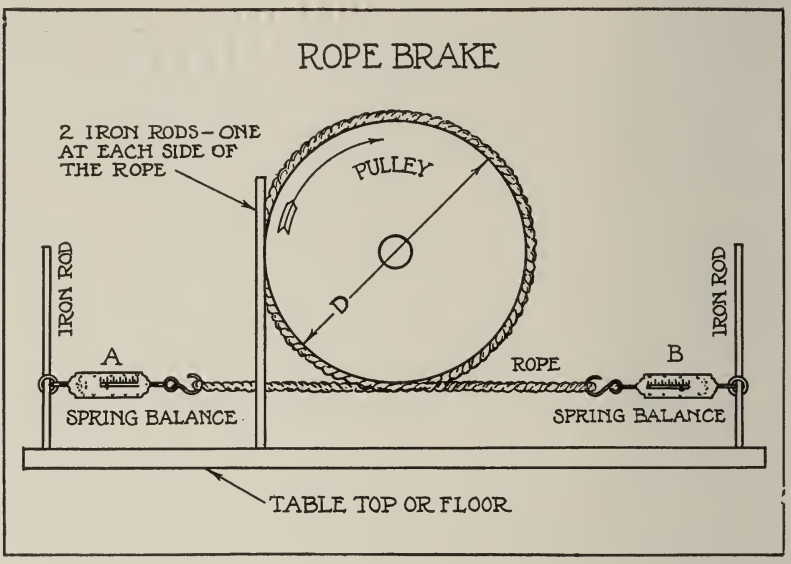
DETAIL OF PEG.
COSTUMER



THE ROPE BRAKE

The Prony brake is an instrument that is most commonly used in determining the horse power of a motor or of a machine. This instrument, however, is large, clumsy and difficult to construct and a more simple apparatus, the rope brake, which is easily and quickly constructed, may be used. The apparatus consists of a strong rope, two spring balances, four rods and four clamps. The clamps are used to hold the rods in place. Two rods are used to keep the ropes on the pulley and the other two to hold the balances in position. The operation is as follows:

The rope is wound once around the pulley of the motor and the ends fastened to the spring balances so that they both read zero. Then the pulley is rotated by starting the motor and the pull in pounds at each end of the rope recorded.

The horse power can be found by applying the formula, horse power = (A-B) x R.P.M. x D x 3.1416÷33000, in which A is the balance which has the higher reading; B the balance that has the lower reading; R.P.M. is the number of revolutions per minute of the pulley; and D is the diameter of the pulley in feet.

—Alfred Weiss, Chicago, Ill.

REVIEWS

Educational Metalcraft. By P. Wylie Davidson, instructor in the Glasgow School of Art. Longmans, Green & Co., London and New York, 1913. 6¾x8½ in.; 227 pages; 378 illustrations; price, $1.40 net.

This is a practical treatise on repoussé chasing, silversmithing, jewelery and enameling, "especially adapted to meet the requirements of the instructor, the student, the craftsman and the apprentice." The book covers the field from the standpoint of materials, tools and methods. Die-cutting, as a means of decorating surfaces, is briefly treated, also the process of making the dies.

In general it may be said that the designs shown in the book are different from those found in American books on metalwork and for that reason ought to be suggestive to American teachers.

Farm Boys and Girls. By William A. McKeeser, professor of philosophy, Kansas State Agricultural College, published by the Macmillian Company, New York, 1913, illustrated; 326 pages, 5x8½ in.; price $1.50.

This is another volume in *The Rural Series* edited by L. H. Bailey. It is intended for two classes of readers—the parents of rural children, and those who are interested in carrying forward work for the betterment of rural communities. The book begins with two chapters which outline some of the fundamental principles of child development.

The book is full of inspiring suggestions for the uplift of rural life, especially the life of the girls and boys. The suggestions are specific and "based on what has already been undertaken with a degree of success or has been planned for in some rural community."

Principles of Cooking. By Emma Conley, state inspector of domestic science for Wisconsin. Published by the American Book Co., New York, 1914; illustrated; 206 pages; 5x7 in.

This is intended as a textbook for secondary and vocational schools. In it the principles of cooking are reduced to so small a number that they may be easily mastered, if properly presented. Foods are grouped into less than a dozen classes, and when the principles which apply to each class are learned and practiced, each pupil will know how to prepare a variety of dishes from each food or class of foods.

The Craft of Hand Made Rugs. By Amy Mali Hicks; published by McBride, Nast and Company, New York, 1914; illustrated; 5¼x8 in., 250 pages; price $2.00, postage 14 cents.

The book is dedicated "To every one who works for the joy of working." This seems to express the spirit of the book. It tells how to use the old time methods of making rugs by hand, but how to improve them by adding careful planning in color and design, that is, to put into them the art feeling of

our own times. Directions are given for making the braided rug, the knitted rug, the crochet rug, the hooked rug and the colonial rag rug. Also the subjects of dyeing and stenciling are treated and in a pertinent way.

Physics of the Household. By Charleton John Lynde, professor of physics, McDonald College, Canada. Published by the Macmillan Company, New York, 1914; illustrated; 5¼x7½ in., 313 pages; price $1.25.

To quote the author, "it covers the ground usually covered by elementary textbooks, but differs from many of them in two ways: first, the illustrative examples and applications are taken largely from the home; second, the common system of weights and measures is used, later the metric system is introduced, using the two systems side by side. The common system is the one the students *must* use should they ever apply the knowledge in every day life. Furthermore, the writer, tho a strong advocate of the metric system, believes that it is pedagogically unsound to try to teach an unknown subject by means of an unknown system of weights and measurements."

Elementary Household Chemistry. An introductory textbook for students of home economics. By John Ferguson Snell, professor of chemistry, Macdonald College, McGill University. Published by The Macmillan Company, New York, 1914; illustrated; 5¼x7½ in., 307 pages; price $1.25.

In this book the author has endeavored "to introduce the application of chemistry to household affairs as early and as often as possible and to present only such portions of the subject matter of theoretical chemistry as is essential to the comprehension of these applications."

The Modern High School, Its Administration and Extension, "with examples and interpretation of significant movements." By Charles Hughes Johnson, professor of secondary education, University of Illinois, and author of the companion volume, *High School Education.* Published by Charles Scribner's Sons, New York, 1914; 7½x5 in.; 840 pages; price $1.75.

The preface states that "the field covered is a survey of policies, examples and suggestions of ways and means of making the strictly socializing work of our actual high school more definite, more effective and more universal.

Present Status of Drawing and Art in the Elementary and Secondary Schools of the United States, United States Bureau of Education, Bulletin No. 13, 1914. By Royal Bailey Farnum, state specialist in drawing and handwork, Albany, N. Y.

This is an extensive treatment of the subject, filling 375 pages. Added to this are 61 pages showing, from schools all over the country, examples of drawing, applied design, school decoration and the arrangement of school exhibits.

The Essentials of Business English. By Porter Lander MacClintock. Published by LaSalle Extension University, Chicago, 1914; 5¼x8 in., 272 pages; price $1.40, *postpaid.*

It gives the "practical, useful core" of the subject and no more. A sur-

prising thing is that the style of the book is enjoyable. The author supposes that you are interested in the subject to begin with, and then he keeps you so. Think of occasionally having a quiet laugh to yourself while studying grammar.

Technical Geometry. By Horace Wilmer Harsh, Head of Department of Mathematics, School of Science and Technology, Pratt Institute. Published by John Wiley and Sons, New York, 1914; 5¼x8 in., 244 pages; price $1.25.

Tho complete in itself, this book is Vol. III of the *Constructive Textbook of Practical Mathematics,* "for use in industrial, manual training, technical high schools and colleges and apprentice and evening classes, containing the practical essentials of arithmetic, algebra, geometry, trigonmetry, analytics and calculus based on industrial data."

Radford's Manual Training, Vol. I and II, edited under the supervision of William A. Radford. Published by The Radford Architectural Company, Chicago. 6x8¾ inches; 312 pages in each volume; price $3.00.

In these two volumes are brought together the drawings and descriptive matter contained in articles written for the *American Carpenter and Builder,* by Ira S. Griffith, professor of manual arts at the University of Missouri. Most of these are pieces of furniture. The articles were written for the use of boys in their home shops.

Cabinet Making, by J. H. Rudd, with chapters by C. A. Zuppann and Walter K. Schmidt. Published by the Grand Rapids Furniture Record Company, Grand Rapids, Mich., 1913, 6¼x9¼ inches; 210 pages, with numerous line drawings for illustrations.

The author's aim in this book was to supply a double demand: to meet the needs of the young cabinet maker for a simple book of guidance, and to meet the needs of the manual training and trade school teacher for information concerning standard forms and trade practice. It is not a reference book of the highest type, but it contains much that is helpful. The chapters on molding, veneering, factory planing, and the construction of a fuming box, as well as those on construction and laying out work, furnish information of real value to teachers.

RECEIVED.

Art of Keeping in Good Health. By Emil Wilk, published by the Concordian Publishing House Print, St. Louis, Mo. Paper bound, 5x7 in.; 38 pages; price 25 cents.

Students Auditing. By Harry E. Evans, lecturer in auditing and accounting at the Municipal School of Commerce, Manchester, England. Published by Longmans, Green and Co., New York, 1914, 5x7 in.; 187 pages; price $1.30.

Tool Steel from Maker to User. This is a beautifully illustrated pamphlet containing historical and other material of general interest to steel users. Published by the Colonial Steel Company of Pittsburg, Pa.

Progress in Vocational Education. By William T. Bawden. A reprint of Chapter XI of the Report of the Commissioner of Education, Washington, D. C.

Teaching Printing in the Public Schools. The June-July Number, 1914, of the Apprenticeship Bulletin, issued by the North End Union School of Printing, 20 Parmenter Street, Boston, Mass.

The Law as a Vocation, by Frederick J. Allen. Issued by the Vocation Bureau of Boston, 1913. 5½x7½ in., 97 pages; price $1.00.

This book presents a clear, accurate and impartial study of the profession of the law by the special investigator of occupations of the Vocation Bureau.

Materials and Construction, by James A. Pratt, director of the Williamson Free Trade School of Mechanical Trades. Published by P. Blakiston's Son & Co., Phliadelphia. 5x7 in., 196 pages, with 85 illustrations; price 90 cents net.

Slide Rule Notes, by H. C. Dunlap and C. S. Jackson. Published by Longmans, Green and Co., London and New York, 1913. 5x7½ in., 128 pages; price 75 cents. This book deals "with the ordinary 25 c. m. slide-rule, as designed by Colonel Mannheim."

MANUAL TRAINING
AND
VOCATIONAL EDUCATION

DECEMBER, 1914

THE RELATION OF VOCATIONAL TO ACADEMIC INSTRUCTION

HERBERT G. LULL

IN the Manual Labor Movement in the United States (1830-1845)[1] we have the first attempt to relate vocational to academic instruction. In the main the movement was unsuccessful.

The next systematic attempt to establish manual instruction in connection with the academic courses of secondary schools did not occur for nearly half a century. This was the introduction of manual training into the public high school. Manual training courses were introduced into the high schools in the early eighties by the way of two well known higher technical schools, the Massachusetts Institute of Technology and Washington University at St. Louis.

Before this time there had been more or less miscellaneous trade instruction offered in connection with secondary instruction. Again as we have seen so many times in connection with the academic branches, it remained for the higher institutions to standardize and sanction the manual work of the secondary schools. The professional training needed by higher institutions in preparing engineers for practical work was handed down to the high schools. Engineering students needed laboratory work in applying the principles of engineering to the trades with which they were concerned. Without such work the engineers were poorly prepared to direct the skilled workmen under their supervision. Only such work was done as would illustrate the principles of engineering. Details were omitted and various objects of construction were therefore never completed.

This engineering laboratory idea came to the United States from Russia by way of an exhibit made by M. Della-Vos at Philadelphia in

[1]The Manual Labor Movement in the United States, *Manual Training Magazine,* June, 1914.

1876, and by way of the Paris Exposition in 1878. The Massachusetts Institute of Technology established a school of Mechanic Arts in 1876, and Washington University at St. Louis established a similar school in 1879.

It was soon seen that the shop practice done by the engineering students in the higher technical institutions could be done by high school boys. With this specific preparatory aim was coupled the idea that such work possessed great value as an element in general education. The Mechanic Arts School of the Massachusetts Institute of Technology and the Manual Training School (later known as the Woodward Manual Training School) of Washington University, received boys of high school age. The former soon discontinued this plan, but the latter continued and is today a standard secondary manual training school. It prepares students not only for higher courses in science and technology, but also for commercial and industrial pursuits. The purpose and character of this school was set forth as follows:

> Its object shall be instruction in mathematics, drawing and English, branches of a high school course, and instruction and practice in the use of tools. The tool instruction, as at present contemplated, shall include carpentry, wood-turning, pattern-making, iron chipping and filing, forge work, brazing and soldering, the use of machine-shop tools, and such other instruction of a similar character as may be deemed advisable to add to the foregoing from time to time. The students will divide their working hours as nearly as possible equally between mental and manual exercises. They shall be admitted on examination, at not less than fourteen years of age, and the course shall continue three years.[2]

I shall not consider manual training instruction in these institutions farther because our main problem consists in determining the relationship of manual training instruction to the academic instruction of the high school.

MANUAL TRAINING FIRST INTRODUCED INTO THE HIGHER INSTITUTIONS

Manual training was brought down to the high schools from the higher technical schools, and then from the high schools to the grammar grades. As has already been stated, the Russian manual training introduced into the higher technical schools was to furnish a laboratory for the application of certain fundamental engineering principles. The work was very vital to the engineering student, connecting it as he did with his mathematics and his future profession, but when this same

[2]Manual Training and Industrial Education, Report of the Commission to the General Court, Massachusetts, 1893, pp. 11-16.

work was brought down to the high school detached from engineering principles, mathematics, and the future work of the student, it necessarily lost much of its meaning and interest. Aside from the interest in the physical activity, it became as formal as Latin grammar worked up too far in advance of its use. Yet this very characteristic was thought to be proof of the educational value of manual training. From the time of its introduction into the high school down to 1890 much time was taken in the discussions of the subject at the meetings of the National Educational Association to prove or disprove its mental disciplinary value. Those who supported it as a discipline usually emphasized the fact that it did not lead to a vocation. We read in a report of the National Educational Association of 1888, on the introduction of manual training into the schools of New York:

> Manual training is admissable into the schools only as a means of general and not of special education. "The industries of this metropolis are too diverse, the sentiment of equality too strong, the ambition to rise is too general to allow of any scheme that would designate certain pupils for particular walks of life. Rather must we seek, if we use new methods, to get by the means of them, better results of a general nature, better trained and disciplined minds and greater attitudes and powers for living and doing in whatever may be the pupils' future career.[3]

Certain manual operations may be selected which will be of highest disciplinary value. We read from this report again:

> Notwithstanding misdirected efforts in the past, there are certain manual operations which time and experience have sufficiently tested to demonstrate their usefulness and their availability. These operations have the following characteristics: They are such as to lead the pupil to acquire correct conceptions of form thru the careful and systematic discipline of his sense perceptions, and to require, as a test of the accuracy of these (perceptions) their correct manual embodiment in material; and further to give a practical knowledge of natural laws and of the qualities of materials. These are: carpentry work, modeling in clay, construction work, paper and pasteboard work, drawing to a scale, sewing, cooking.[4]

During this early period, as we would expect, we find manual training courses described in terms of processes, rather than in terms of projects. If projects are found at all, they came at the last end of the course, as, for example, the following course in drawing and manual training listed in 1888 shows:

[3]Report of the National Educational Association, 1888, pp. 859ff.
[4]Ibid.

First Year

Drawing, mechanical and freehand.

Carpentry, and joinery; wood carving; wood-turning.

Second Year

Drawing, line shading and tinting; machines, development of surfaces, freehand detail drawing, isometric projections.

Forging, drawing, rivetting, punching, pinching, welding, tempering, pattern-making, molding, soldering.

Third Year

Drawing, brush shading, shadows, geometrical and architectural. An elaborate finished drawing closes the course. Work in machine-shop, benchwork and fitting, turning, drilling, planing, screw cutting, etc.

The making of a project.[5]

The formal treatment of manual training was carried from the high schools into the grammar grades. For example, the manual training course in the Boston grammar grades in 1893 was prescribed in every detail both in content and method. Moreover, nearly all of the work consisted in distinct exercises which were not used in making a complete article of handwork. Such exercises as the following consumed much of the time: Sharpening exercise, planing exercise, dowel, boring exercise, chiselling exercise, blind dowel joint at corner. A few simple projects as coat hanger, bread trencher, picture frame, towel roller, match safe, and the like, were made, but every step of the way was dictated in the following manner:

MEASURING AND SAWING

Material, ⅞″ white wood; sawing dimensions, prepared for pupil; planing dimensions, 14″x2″x⅞″, prepared for pupil.

ORDER OF EXERCISES

1. On entire length of No. 1 surface, with a rule held on its edge, mark off 2″ measurements.

2. With the beam of the trysquare pointing to the left, and held close to No. 2 surface, draw lines thru the 2″ measurements across the wood.

3. With the head of the marking-gage held close to No. 2 surface, gage seven lines ¼″ apart the entire length of No .1 surface.

4. With the beam of the bevel pointing to the left ,and held close to No. 2 surface, adjust the blade to angle 45° and bisect the second, fourth, and sixth squares.

Analysis for marking: Dimensions, 52; gaging, 28; total, 100.[6]

[5]Report of the United States Commissioner of Education, 1887-88, p. 889.

[6]Report of Massachusetts Commission on Manual Training and Industrial Education, 1893, pp. 140-164.

VOCATIONAL SIGNIFICANCE OF MANUAL TRAINING NOT EMPHASIZED

During the early days of manual training instruction in the secondary schools of the United States the great majority of school men, as we find their opinions registered in the National Educational Association reports, in the educational magazines of the times, and in the reports of the United States Commissioner of Education, were afraid to recognize, much less emphasize the trade or vocational significance of manual training. The educational values were put forward at all times. Today we emphasize the educational values, but now we are beginning to see that the vocational significance attached to manual training is precisely the source of its greatest educational values. Thru its vocational significance manual training offers opportunities for life adjustments. Manual training related to vocations gives the student a control of nature which counts definitely for a standing among his fellows. It presents definite appeals to him, and definite appeals stimulate thotful activity, for he is conscious of his needs and he must know what will count for his success. Manual training as related to the life of the community and to the organization of industry is freighted with meaning for citizenship surpassed by no other school activity. Manual training so conceived becomes a source of vital problems, and becomes less a series of exercises to follow upon specific dictation.

The vocational and social significance of manual training provides the condition under which the development of initiative, organizing power, and reflective thinking become possible, as well as accuracy and speed in observation and motor activity. This view of the subject neither tolerates manual training as a discipline nor as merely affording preparation for specific arts; it means manual training socialized or vocational training socialized. But this point of view is slow in gaining ground in the United States. Manual training is still thought of as it was in the '80's. Note the following clear statement of this point of view:

> Altho few new experiments in this direction have been reported, distinct progress in respect to the general understanding of the subject is noticeable. This progress appears chiefly in the clearer recognition of the relation that manual training bears to general development, or, in other words, in the clearer recognition of its educational function. Physiologists have long been telling us that muscular exercise invigorates the brain; in addition to this important result, which the exercise of the hand shares with all other bodily exercise, the advocates of manual training have urged its effects in quickening observation, in

increasing the range and acuteness of perceptive faculties, and in establishing an "intimate familarity between the mind and things."[7]

How completely academic and disciplinary in character were the values which came to be assigned to manual training instruction was shown by President Butler's resolution prepared for the New Jersey Council of Education, 1886:

Whereas, There are several and conflicting uses of the term Manual Training, be it hereby

Resolved, That the New Jersey Council of Education defines Manual Training as training in thought-expression by other means than gesture and verbal language, in such a carefully graded course of study as shall also provide adequate training for the judgment and the executive faculty. This training will necessarily include drawing and constructive work, but experience alone can determine by what special means this instruction may best be given.[8]

Thus manual training instruction in the high schools came to be measured by the traditional forms of the academic branches. Like every new branch that had been introduced into the high school, manual training was "tabooed" until it could be shown that it possessed the same kind of educational values as the older branches were supposed to possess. Like other new branches it gained recognition slowly. The Committee of Ten reporting in 1893, made no mention of manual training instruction. Stanford was the first university to accept manual training among its optional entrance subjects, 1901.

At present, however, all of the leading universities give some credit for manual training as an entrance subject.

A CHANGING POINT OF VIEW

During the last decade the rapidly growing vocational interest in education has been wrenching manual training away from its academic moorings. We read in the tentatively formulated doctrines of the Committee on Manual Arts of the Commission of the National Education Assication on the Reorganization of Secondary Education (1913) that: "The major purpose of instruction in manual arts is to contribute directly to the vocational efficiency of the pupil."[9] But the vocational

[7]Report of U. S. Commissioner of Education 1885-86, p. XVI.

[8]Report of the United States Commissioner of Education, 1887-88, Manual and Industrial Training, chapter XV, page 825.

[9]Report of Committee on Manual Arts of the Commission of the National Education Association on the Reorganization of Secondary Education, 1913, pp. 64, 65.

aim of manual training must not increase its "taboo," for "Whatever we may undertake in reorganizing the secondary school, we must be careful to avoid anything which will create the impression that some courses are not 'open at the top'."[10] The vocational and social values of manual training are worthy of college recognition.

> For years to come there will be in our secondary schools principals and teachers who, no matter how valiently our committee may assert that 'the best preparation for life is the best preparation for college', will, nevertheless, regard as inferior any and all courses for which college entrance credit is not allowed. It is this attitude of the college-bred secondary school teacher which constitutes the real domination of the college over the secondary school. Teachers of manual arts have had far too much experience in the past in trying to advance this subject in the face of this kind of opposition to allow them to forget the futility of trying to induce children to take the work when they understand that no credit is given for it. It is, unfortunately, true that the very children who have the least need of college credit and the least opportunity of making use of it are frequently detered from taking courses which are thus ranked as inferior.[11]
>
> We believe that manual arts may be so taught as to contribute to the intellectual power and social outlook to such an extent as to fully justify its acceptance as a part of preparation for college.[12]

As manual training is becoming vocationalized along broad social lines, so vocational training is outgrowing its narrow trade character. Both bid fair to merge one into the other in the high schools. "Industrial work, if it is to be education at all, must prepare for living as well as for livelihood. It should most certainly include manipulation, but along with it there should be a vast amount of content or subject-matter reaching out into various related fields."[13]

We can now begin to see how the so-called academic subjects of secondary instruction and manual work which were so far apart and unrelated in the days of the Manual Labor Schools are about to integrate and become instruments in a common service. But two more steps must be taken before this can be fully accomplished. First, the constants of all secondary school courses must include more of the social subject, and, second, all subjects of the curriculum must be socialized. The socializing of instruction, however, must be reserved for another article.

[10]Ibid.

[11]Ibid.

[12]Ibid.

[13]Winslow: The Relationship between Content and Manipulation, illustrated by work in concrete; MANUAL TRAINING MAGAZINE, Feb., 1914, p. 212.

SOME CONCLUSIONS WITH REFERENCE TO PREVOCATIONAL WORK IN THE PUBLIC SCHOOLS

Philip S. Hasty[1]

From a careful consideration of the data at hand, some conclusions seem possible:

1. *Latitude of the Movement.* A powerful influence for greater freedom, greater flexibility, and greater adaptability in our schools is at work throuout the land—from Los Angeles to Boston; from Calgary to New Orleans.

Sixty-six years ago Horace Mann wrote "The reason why the mechanical and useful arts—those arts which have done so much to civilize mankind, and which have given comforts and luxuries to the common laborer of the present day such as kings and queens could not command three centuries ago—the reason why these arts made no progress, and until recently, indeed, can hardly be said to have had anything more than a beginning, is that the labor of the world was perfomed by ignorant men. As soon as some degree of intelligence dawned upon the workman, then a corresponding degree of improvement in his work followed."

In 1749 Benjamin Franklin issued a pamphlet entitled, "Proposals Relating to the Education of Youth in Pensilvania."

This was the great principle that underlay his plan: Nothing should be taught until the scholars were impatient to learn it. There should be no logic till, by debating, they began to feel the need of logic. There should be no mechanics taught until the story of the marvelous machines used in the arts, in manufactures, in war, had aroused a desire to know something of the mechanical principles by which such matters were accomplished. There should be no oratory till the study of history had filled them with admiration of the great things done by the masters of oratory. There should be no geography till a knowledge of past events awakened a longing to know the bounds, the situations, the exact extent of the countries wherein such events had taken place. Such, in brief were Franklin's proposals.

Slow but sure has been the conscious acceptance of these doctrines until a few men, having the strength of their convictions, have been able to raise the anchor of tradition and embark again upon the sea of progress.

[1]See article by the same author in the November number of this magazine.

II. Four Types of Schools. This movement was well under way as examplified in the admirable reorganization of the Los Angeles system upon the six and six year basis, when a mighty current of industrialism swept some of our (school) pilots from the true course, and they became separated from the rest—fragments of the original expedition.

Three other types of schools have been the result:

(a) The "Elementary Industrial" type as found in Seattle and Indianapolis.

(b) The so-called "Boys' Vocational School" type in New York City, and

(c) Part-time or continuation schools, Cincinnati and elsewhere.

Let us consider for a minute these three types.

(a) By comparison of the plan of work, courses of study, and time allotments, it will at once be clear that the "Elementary Industrial" course as offered in Seattle is almost identical with the "Vocational" course in Los Angeles. It appears then, that the establishment of these schools in Seattle and other places where they occur, is but a fragment of the whole well-rounded scheme of reorganization as carried out in Los Angeles, and should be greatly broadened to secure its full value.

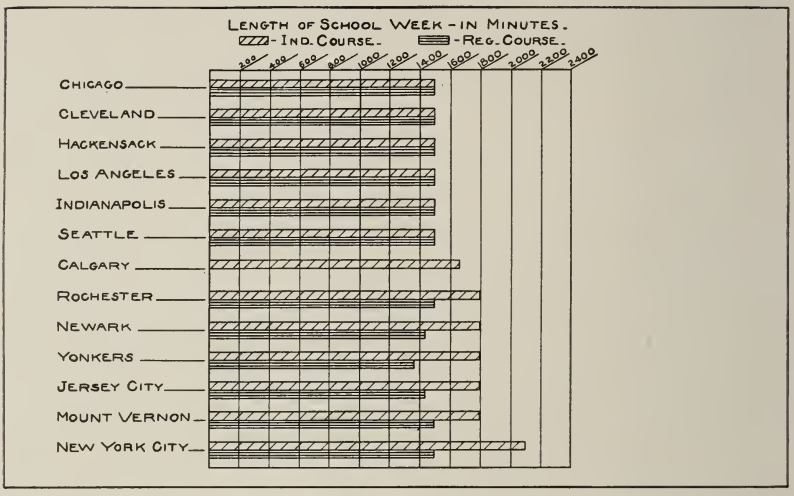
(b) Comparison, again, with the work as outlined for the "Boys" Vocational School," indicates a lack of adequate cultural or liberal training (in the broad sense), and a visit to the school will further strengthen this impression. Boys having once entered this school are, by virtue of the limited scope of the courses offered, thereafter debarred from high school and a higher education, and *compelled* to remain in industry.

It would seem that boys who have progressed normally—or nearly so—thru the sixth grade, should be able to secure at least a high school training. For such as they, a school of a more liberal type would offer broader opportunities. It seems decidedly unwise to close the doors behind our fourteen-year-olds. They are too immature to know whether they wish to devote their lives to industry or to law; to pattern-making or to surgery.

First of all, reorganize the course of study and plan of work of the whole system, so that all types of children may be provided for. Offer *strong* courses, (a) General; (b) Commercial; (c) Industrial, (Agricultural in some communities), which *do* lead to higher fields of learning, and I have great confidence that there will be little place in the average community for schools of the "Boys' Vocational School"

type. There is grave question whether, outside of our large cities and special industrial centers, there is any need for special vocational or trade schools.

(c) Continuation Schools. This plan will receive special mention later.

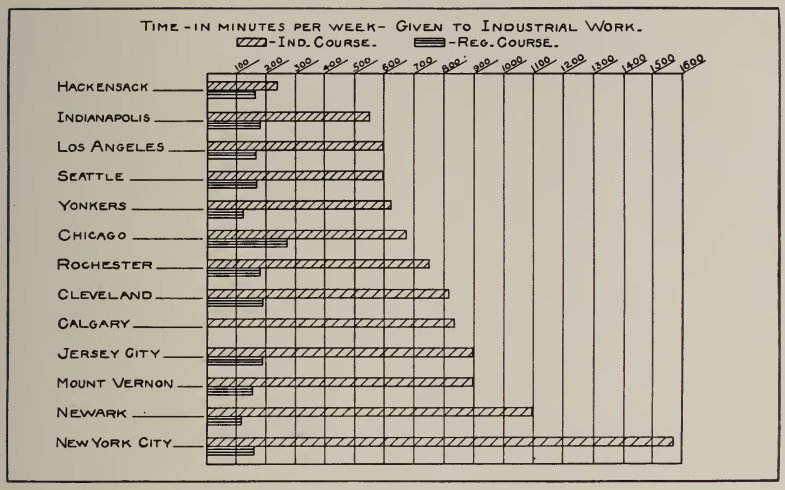


III. Length of Day. There is a marked tendency to lengthen the school day. This is eminently desirable, at least in those courses offering a large percentage of vocational work, to allow sufficient time for academic study.

IV. Buildings. Separate buildings for this industrial work would seem to be unnecessary under the Seattle scheme, while under the Los Angeles plan, a separate plant, or union with the regular high school seems advisable.

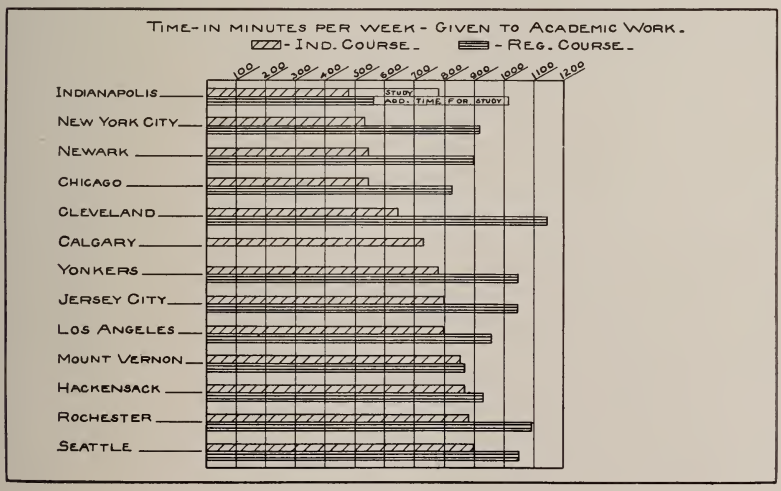
V. Variability of Time Allotments. Upon examination of the figures, one is immediately impressed with the great variability among the different cities in the amount of time devoted to academic and industrial work. On the whole there is a tendency to decrease the amount of academic work in the industrial courses and to greatly increase the amount of time given to shop and laboratory practice.

In every school studied, emphasis is placed upon the close correlation of academic work, drawing, and the industrial processes. In some



cases this relation is undoubtedly largely imaginary. The oppourtunity for closer relationship certainly exists, but just how far it can be carried with profit is a question yet to be determined by practice.

VI. Efficiency. A common claim among the advocates of these industrial courses seems to be similar to the following, quoted from Seattle: "The new type of course is not offered on the assumption that



those who take it are preparing to seek employment at its conclusion. Many parents feel that a course of study providing for a training in the practice of these useful occupations and a study of the principles that are fundamental to their economic and efficient application to life, will furnish a much more satisfactory preparation for the duties of life and also for a higher education, than that afforded by the regular academic courses."

If this claim be true—if such courses train in a more adequate way for life and furnish a smoother route to the high school, why in the name of common sense should not all courses be based upon life's problems in their most practical form? It is tradition alone that holds us back.

VII. The Junior High School. The junior high school seems to fill the gap between the elementary school and the high school. While it cannot, in any sense, be considered a panacea for all of our school ills, the successful results so far attending its introduction, lead to the belief that every city would do well to organize its entire system upon this plan.

The size of the community will make necessary certain modifications, to meet local conditions; but. in general, from the village with only one seventh and one eighth grade and a small high school, up to a town of twenty thousand, the entire secondary school might be conveniently housed in one central plant. It is really desirable to take advantage of the superior opportunities thus offered.

VIII. Order in Which Schools Should be Established. This reorganization and the offering of strong industrial courses in the junior and senior high schools, should *precede* the establishment of strictly vocational schools in any community.

IX. Trade Schools. Vocational or trade schools, leading strictly into industry and not to higher technical schools, should be of high school grade and open only to those pupils, sixteen years of age, or more, who have decided definitely to follow such a career, except that special industrial classes or schools should be provided for all fourteen-year-olds who are retarded three years or more and cannot, with any degree of success, continue the regular work of the elementary school. Such pupils will leave school and drift into unskilled occupations unless early specialization be provided for.

X. Continuation Classes. The success of the Cincinnati compulsory and voluntary continuation schools leads one to regard them with

favor. In many of our smaller communities, at least, where any form of adequate specialized trade training is practically prohibited by the excessive cost of equipment and maintenance, this plan should be of the greatest service. Hearty cooperation between the school and the shop is destined to solve many of the problems which now confront the ardent advocate of industrial education. Educator, employer, employe, labor union, and overtaxed citizen are all looking for a practical solution. Why may this not come thru the wide open door of the shop and the wide open door of the school?

XI. Vocational Guidance. The possibilities of vocational guidance thru proper prevocational courses, and a highly flexible organization such as that shown in the Grand Rapids Junior High School (and elsewhere), have not begun to manifest themselves. Without closing the doors to higher institutions of learning, in the seventh grade, let us "try out" our boys and girls, thru active participation in a variety of typical and fundamental industrial processes. The eighth grade (and posibly the ninth) will furnish a period of probation, the beginnings of specialization.

It is impossible even to guess how far reaching and valuable the results may be in aiding an intelligent choice of a useful career.

NO THOUGHTFUL MERCHANT WHO RECOGNIZES HIS OWN RESPONSIBILITY IN THE TRAINING OF THE YOUNG MEN IN HIS EMPLOY, ASKS OR EXPECTS THE PUBLIC SCHOOLS TO TRAIN BOYS FOR HIS BUSINESS; HE DOES EXPECT, OR HAS A RIGHT TO EXPECT, THAT THE BOYS WHO COME TO HIM SHALL BE GROUNDED IN THESE FUNDAMENTALS (CHARACTER, ALERTNESS, ANALYTICAL POWER, POWER OF EXPRESSION, THORONESS). WHAT HE WANTS NEXT TO MORAL CHARACTER, IS A BOY THAT HAS GUMPTION.—Samuel F. Hubbard.

RATIONAL BUYING AND THE PUBLIC SCHOOL

H. D. Kitson

THE development of the ideal that education should be adapted to social and economic needs has occasioned many sweeping changes in educational practices. Pressure has been exerted upon the school by industry, by commerce, by the home, and by educators themselves, urging that obsolete methods be abolished, and that education be adapted to modern life instead of to that of a hundred years ago. The school has responded to these demands with a multitude of innovations, but has found it impossible to keep pace with the social and economic changes, so rapid are the advances of the times. The result is that there are many gaps in the connection between the school and society. One of these exists because public instruction in buying is neglected. The seriousness of this omission will be readily apparent after a brief consideration of the conditions that prevail in modern commercial life.

A glance at the organization of modern business shows that the entire system is designed on the basis of furthering sales. The ultimate aim of all business is to sell. To accomplish this end, no effort is too great to be made, and no expense too enormous to be incurred. The amount of money spent annually in attracting the public by means of advertising mounts into the hundreds of millions. More significant still is the care that is being expended in order to make this advertising more effective. The skill of brush and pencil, the genius of the pen, and the experiments of the psychologist are all evoked in the interests of this colossal industry. Advertising is rapidly approaching the status of an exact science and is becoming more and more powerful in its influence upon human conduct.

Parallel with the progress of advertising has gone a correspondingly rapid advance in methods of selling by personal contact. Salesmanship has become one of the leading occupations of the country. In the state of Wisconsin, retail selling alone ranks third in the list of occupations. But not only in point of numbers is the business of salesmanship expanding; growth in effectiveness characterizes it as well. It is rapidly taking on the ear-marks of a science. It studies the sales process from the psychological standpoint. It seeks to discover the mental operations concerned in making a sale, and to devise means of

influencing the purchaser. Schools for salesmanship have sprung up in great numbers; university extension courses have been organized, and some public schools have placed salesmanship in their curricula. These courses make elaborate analysis of sales-making, and give thoro coaching in the strategies of *pre-approach, approach, demonstration, closing* and so on.

OVEREMPHASIS UPON THE APPEAL TO PURCHASE

So thoroly have the principles underlying human conduct been studied and exploited by the marketers of the world's commodities, that the life of the ordinary citizen has become a continual struggle against appeals to buy. In a thousand guises they make their insidious presence felt; try as he will, he can not escape them. If he picks up a newspaper or magazine, he finds a full third or fourth of it devoted to glowing advertisements of commodities, every one "the bargain of a lifetime." As he rides to and fro in the street car, his wearied gaze encounters a host of announcements, clamoring for attention. At the theater, if he attempts to relieve the ennui of an insipid performance by persuing the program book, he finds himself face to face with the same baneful influence. At church, if he attempts to relieve the tedium of a dull sermon by surreptitiously glancing thru the parish bulletin, he finds that even within these sacred precincts the omnipresent physic salesman has forced his way. As if he were not already harassed beyond endurance by these silent attacks upon his buying gullibility, the hounded citizen is further beset by the daily importunities of numerous living salesmen representing life insurance, real estate, automobiles, and books. Each one is a skilled manipulator in his line, and each one seems a more convincing talker than the one before. Each one possesses more knowledge about the human mind than does his victim, and with uncanny accuracy he probes out his most vulnerable spot and makes him a purchaser.

The unwise and unnecessary expenditure of money that prevails in America today results in an appalling amount of misery and economic waste. This is a social and economic situation which the school should take cognizance of and seek means to correct. Education is the most potent means for the amelioration of these evils, and the public school is the proper instrument. In accordance with the modern ideal of vocational education, the school has begun to lay great emphasis upon pre-

paration for productive efficiency. But there is one step further which it must take; it should also train for consumptive efficiency. Of what benefit is it to increase the earning capacity of a boy or girl if the surplus earned is expended unwisely? A careful training in buying is as much an addition to one's economic efficiency as a training in power to produce.

There is a further reason why emphasis on productive efficiency should be counterbalanced by emphasis on consumptive efficiency. Efforts toward economy of production are really of most benefit to the few who derive most advantage from economical production; this smacks of class favoritism, for all do not reap equal profits from increased efficiency in production. Everyone is concerned on the side of consumption, however, for every one is a consumer. Attention paid to this phase of vocational education will be of benefit to all.

The new program for education, then, should include instruction in buying. The school feels it a duty to teach a girl how to make a dress. It should with equal propriety, teach her how to buy the goods for that dress, then how to buy shoes, hats, etc. The commodities of everyday life are fit subjects for education. They come into vital relationship with men and women. Knowledge about them will be vastly more beneficial to the ordinary citizen than the ability to repeat the names of all the capital cities on the globe. In other words, education, in order to meet the needs of modern life, ought to include a knowledge of how things of ordinary consumption are manufactured, what things are worth buying, and what they ought to cost. In carrying out this program, the very efforts of the seller can be used to excellent advantage. The publicity campaigns being waged by many industries provide valuable material for education purposes. Copious literature is printed for free distribution, containing clear and interesting descriptions of processes of manufacture. The "reason why" talks, now so prevalent in advertising literature, are very useful for pointing out merits. Pupils thus learn to discriminate between the worthless and the good, and to look for reasons why. The practice in thus weighing reasons, and the intrinsic practical bearing of it all will furnish means for the acquisition of that desideratum of all education—appreciation of values.

METHODS OF STIMULATING INTELLIGENT BUYING

The plan here suggested indicates a way by which the efforts of the seller can be turned to the advantage of society, and can be made to exert a good influence. The bad influence of modern selling methods

must be overcome in more general ways. Instruction must here be given with the intent of making the individual less amendable to suggestion. Warnings should be given concerning the traps set for the unwary purchaser, illustrated by pointed examples. Attention should be called to the fact that the multifarious appeals to the buying public are carefully planned with reference to psychological principles. In order to counteract these effects, instruction must be given in the most elementary laws of mental action. If science can be used to make sales, it can be used with equal success to break sales. School instruction might well take the form of prophylactics against the allurements of salesmanship. For example, one principle upon which all selling depends, is that the mind tends to accept as true every statement made. Thus when a man sees a chair marked "Only $15.00. Worth $20.00," his first impulse is to believe the statement, and to conclude that he would save $5.00 by making the purchase. The existence of this innate credulity within the human mind should be pointed out, and the precept laid down that in buying, a critical attitude should be maintained. This tends to hold the seller down to hard, verifiable facts, and is a powerful aid in strengthening one's resistance to suggestion.

Another mental trait much utilized in salesmanship is this: Every idea that enters the mind, tends to pass into action. In other words, "every idea of an action will result in that action unless hindered by some impeding idea or physical impediment." This is the reason why clever salesmen always urge quick decisions. They know that if considerable time is given, there will be chances for inhibitory ideas. Consequently they seek in every way possible to prevent the entrance of these ideas into the mind. A good prophylatic to use in such a case is the maxim, Never buy upon your first impulse. Or to state the rule positively, postpone a purchase the first time it is suggested to you. Procrastination is the thief of many a sale. The element of delay is very important in the consummation of any rational purchase. The conditions of a sale are usually unnatural. The article under consideration is isolated from everyday life, and as such, can not be seen in its true perspective. Furthermore, at time of sale, the attention of the purchaser is focused upon the *merits* of the article. Nothing is said about its demerits. That is not the salesman's business, and the buyer can not think of them all on the spur of the moment. Accordingly, decision should, as a rule, be postponed until there is time for dispassionate weighing of pros and cons.

It is readily seen from the foregoing brief discussion, that the introduction of instruction in buying into the public schools will be a long step toward linking up the school with social and economic needs. The acquisition of the kind of information necessary for economic self-defense will be of the utmost practical advantage in everyday life. The sane and scientific treatment of the *rationale* of the buying process will result in the strengthening of many useful inhibitions—a constant aim of education. As a result of such forewarnings, the next generation will be freed to some extent from the errors of wild investment and gold-brick speculations that are prevalent today. The habits of rational buying thus inculcated will go far toward settling for the future generation many of the economic problems that perplex us today.

FROM LANE TECHNICAL HIGH SCHOOL, CHICAGO

ADVANCED PATTERN-MAKING AND MOLDING—HOW AND WHAT TO TEACH

Fred D. Crawshaw and Walter Chrisholm

IN the November, 1913, number of Vocational Education, there appeared an illustrated article on pattern-making. In it the writers described and illustrated the teaching of this subject thru what is usually regarded as an elementary course in pattern-making. This includes the stages covering the principles of draft, shrinkage, and finish in comparatively simple two-part flask work. Patterns involving the use of green and dry cores both for solid and split patterns were considered in approximately the order in which they would naturally appear in a course designed to develop both the principles in pattern-making and molding, and the technic of these subjects.

In this article difficult types of pattern work and molding are considered. The emphasis is laid upon segment patterns for two-part flasks, patterns calling for the use of three-part flasks, plaster of Paris patterns, sweep work in the foundry, and other particularly important foundry practices.

It is assumed that the general methods of conducting a class which were described in the previous article will be used in teaching advanced pattern-making. Essential among these are the demonstration, the use of illustrative material in the form of charts, baked sectional molds, etc., and student practice in all the operations incident to making the different types of patterns, and producing castings from them.

SEGMENT CONSTRUCTION—SPOKE PULLEYS

Cylindrical skeleton patterns such as spoke pulleys and gear wheels are good examples of two-part flask patterns requiring segment construction. Small patterns of these and similar types may be constructed of a single piece of wood or of several layers of wood glued together. However, such patterns have a tendency to warp and, besides, as wood shrinks across the grain, they will soon become twisted and eccentric. The rims of the pulley patterns, *A* and *B*, Fig. 1, were built up in layers, each layer having six segments with the grain of the wood in each running in the direction of the segment chord. The layers were glued

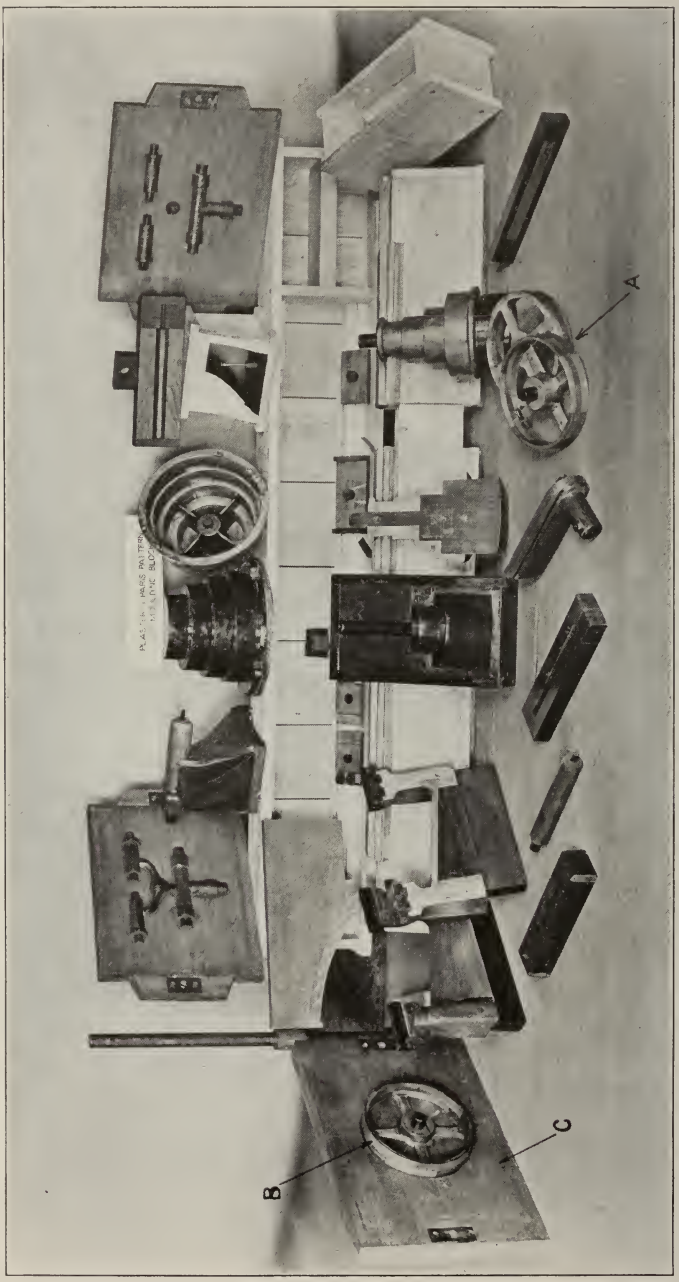


FIG. 1

together so that segment joints in any two succeeding layers do not come over one another. Thus the grain of the wood in one segment binds and holds together two segments in the next succeeding layer. This construction makes the rim, as a whole, strong. Any shrinkage will be toward the center of the pattern and presumably uniform, leaving the rim when turned, cylindrical in shape.

In practically all advanced pattern work where duplicate castings are required, but which vary slightly in certain dimensions, there is an opportunity to make one pattern serve the purpose of many. Thus in spoke pulley patterns it is customary to construct the arms or spokes separately from the rim and not to fasten them to the rim. By making the spokes one-half the required thickness and fastening them permanently to the follow board, *C,* Fig. 1, and by recessing the follow board for the rim, pulley castings of the same diameter, but of unequal face widths may be secured from one and the same pattern. The rim of the pulley, *B,* Fig. 1, was made three inches wide. It may be raised or lowered in the rim recess in the follow board, *C,* Fig. 1

As the molds for both the cope and drag halves of the pulley are made on the same follow board, molds can be produced for pulley castings having face widths varying from two or three inches up to six inches.

GEARS

A gear wheel is a pulley with teeth fastened to the surface of its rim so that it may work with a companion wheel without slipping. The similarity between pulleys and gears makes it necessary only to describe the pattern-maker's method of constructing gear teeth.

Gear wheel work in the past was a very important factor in the trade of pattern-making. Cast gears in earlier times were the only ones used. Great skill and accuracy on the part of the pattern-maker were required, therefore, that gear castings might be true enough to work together without undue friction or lost motion. At present nearly all gears which are to be machined are cut from blank castings, hence the necessity for accuracy on the part of the pattern-maker in making toothed gear wheel patterns has been grealy reduced. Attention should be paid to this fact to avoid the use of an undue proportion of time in a course in pattern-making to the making of gear patterns.

A discussion of gear-tooth forms and how to secure them is omitted here, as books on practical plane and solid geometry and handbooks such

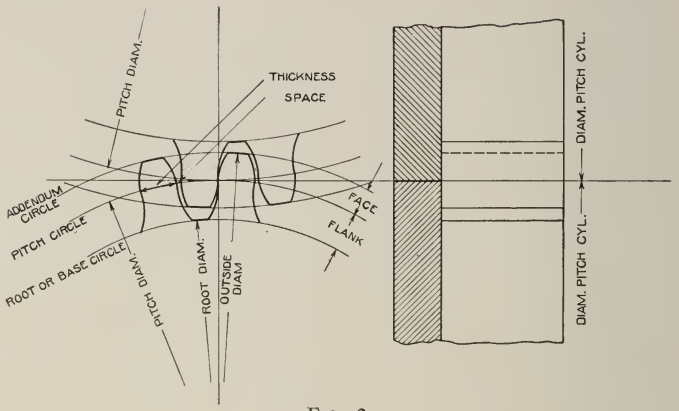


FIG. 2

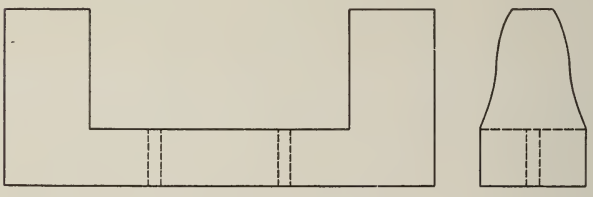


FIG. 3

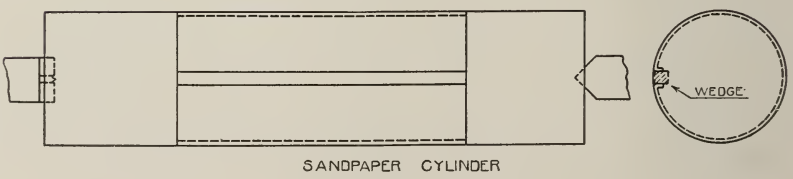


FIG. 4

as Kent's in this country, and Molesworth's in England, cover these points simply and satisfactorily for the use of pattern-makers. One must, however, be thoroly familiar with the drawing and mathematics involved.

SPUR GEARS

The spur gear, Fig. 2, the teeth of which are straight and parallel to the shaft upon which they are fastened, is the simplest form of gear.

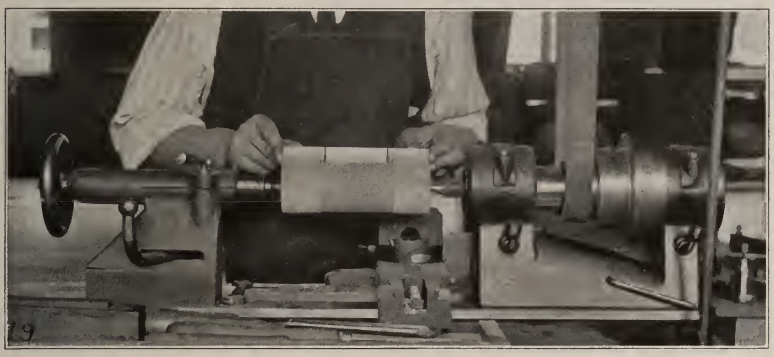


FIG. 5

The methods used in constructing spur gear teeth, with slight modification, can be used in the construction of teeth for almost any type of gear in common use. Of the many methods current in commercial practice only one will be described here.

Strips of wood, rectangular in cross-section, are cut the required length of the gear teeth. Each one of these is fastened from the underside to a jig, Fig. 3, the ends of which are accurately modeled to the shape of the tooth which has first been drawn upon the outside ends of the jig, *A*, Fig. 3. Each block of wood, after being securely fastened in the jig, is chiseled to the approximate form of the jig ends. Upon a revolving cylinder of sandpaper, which is glued into a recess in a cylindrical block of wood, Fig. 4, the jig holding the roughly formed tooth is worked until the tooth is the exact shape of the jig ends. To avoid the possibility of the sandpaper touching the jig ends, the length of the sandpaper should not be greater than the length of the gear tooth. Fig. 5 shows the operation of forming a gear tooth as above described.

To fasten gear teeth to the rim of a gear wheel the perimeter of the wheel should be carefully spaced for the required number of teeth and thru points thus determined a line should be squared across the surface of the wheel. Coincident with each of these is placed the center line of the underside of a tooth. In this position the tooth is fastened

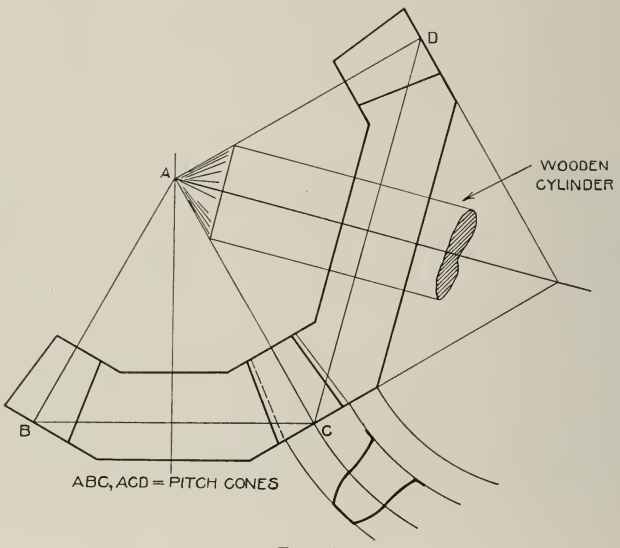


FIG. 6

from the outside securely to the rim. The best construction requires a recessing of the tooth into the rim.

BEVEL GEARS

Fig. 2 shows the relation between a pulley and a spur gear. When two spur gears are meshed together the base cylinders, called pitch cylinders, are those which, if the teeth were not present, would come in contact and work together by friction.

In bevel gears similar base forms are cones with a common apex. They are called pitch cones. A pair of bevel gears with their pitch cones drawn are shown in Fig. 6. It is evident that a bevel gear is merely a modification in form of a spur gear. Likewise the method of making a pattern for a bevel gear is the same as that for making a spur gear with the necessary modification in modeling out the tooth from a portion of the surface of a cone instead of from a portion of the surface

of a cylinder. A jig for bevel gear teeth will be a portion of a cone, the outside surface of which corresponds to one represented by the outside edges of the teeth of the bevel gear to be made.

It is more difficult to make a jig for bevel gear teeth than for spur gear teeth. The following method of forming bevel gear pattern teeth

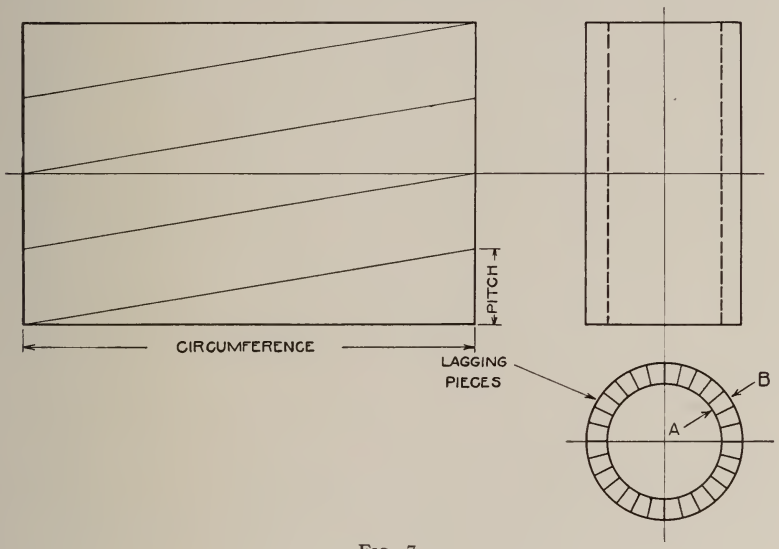


FIG. 7

not requiring a jig is therefore common. Nail onto the outside surface of a conical disc, the size of a cone formed by the base of the teeth of the required bevel gear, strips of wood in the position that the gear teeth would normally have. Fasten in the center of the disc a cylinder the end of which is a cone, see Fig. 6. Place the apex of this cone in the position of the apex of the gear pitch cone, *A* Fig. 6. Lay out the outlines of the large end of the required teeth on the end of each strip of wood which was fastened to the surface of the conical disc. This may be done by tracing around a template. With a chisel pare each strip of wood until a straightedge will come in contact with the traced tooth outline, the apex of the cone, and with the tooth from end to end.

WORM GEARS

A worm gear is a special form of screw. Its threads must be shaped with special care to make them work with the teeth of the worm

wheel. When the pitch of the thread has been determined, a paper pattern for the thread of the worm may be made, as suggested in Fig. 7, by developing the surface of the worm.

A simple and practical method of constructing a worm gear pattern is as follows: Turn a cylinder the length of the desired worm and to a diameter equal to that of the cylinder at the base of its thread, *A,* Fig. 7. Increase the diameter of this cylinder to a little more than that of the finished pattern by lagging on strips fixed temporarily with screws as shown, *B,* Fig. 7. These may be ripped out to the desired angle on a circular saw. The surfaces coming in contact with the cyclinder may be formed on a sandpaper cylinder. Turn the lagged cylinder to the outside diameter of the worm. Wrap the paper pattern for the thread about the cylinder and trace or prick the thread outline upon its surface. Remove the paper pattern. Remove one lagging strip and cut and trim it to the form of the required thread. Replace and glue the formed pieces upon the cylinder. Repeat this operation, removing one lagging strip at a time until the entire worm thread has been formed.

This method may be used to advantage in forming the thread on the pattern for a worm gear when a pattern lathe which will cut a thread is not available. It reduces considerably the necessary tedious work involved in cutting a thread by hand on a solid cylinder.

A worm gear pattern may be made solid if the pitch of the thread is constant, otherwise a split pattern is necessary. A worm wheel pattern must always be split to insure its removal from the sand, the dividing line being along *AB,* Fig. 8.

The construction of a worm wheel pattern is practically the same as that for a spur gear pattern. The joints of the tooth blocks must be parallel to lines on the worm wheel representing the angle the teeth of the wheel make with the face of the wheel or the axis of the worm. This angle is determined as shown in Fig. 8.

THREE-PART FLASK WORK

Pattern-making is so intimately asociated with molding that the pattern-maker must know thoroly not only the different molding processes but the most suitable ones for certain types of patterns. Many patterns are of such a shape that they cannot be drawn from the sand in a two-part flask. A flask made up of any number of parts is sometimes necessary. In some cases the necessary additional flask part,

known as a cheek, may be substituted by a separate, intermediate portion of the molding sand which is separated from adjacent portions by parting sand, thus making the intermediate portion remain at the bottom whenever a part of the flask adjacent to it is removed.

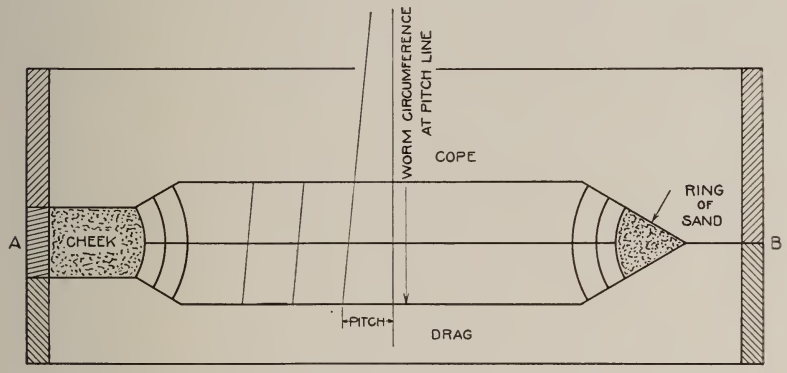


FIG. 8

Fig. 8 illustrates the molding of a worm wheel by two methods. On the left is shown a three-part flask in relation to the worm wheel, and on the right a two-part flask is shown with a separate ring of sand used as a substituted for the central flask part, or cheek portion of the flask. The worm wheel pattern is divided thru the center, *AB*, Fig. 8. This is a typical case, showing that the parting of the mold does not always coincide with the parting of the pattern.

(*To be Continued*)

DRESS AND ITS RELATION TO THE WEARER.

LYDIA BOLMAR AND KATHLEEN MCNUTT.

DRESS should be decoration, never ornamentation. Ornamentation is a gaudy show, attracting attention to itself without reference to the object to which it is applied. Decoration exists to add beauty to the object decorated, by harmonizing with it in texture, line and color. Therefore, dress, to be in good taste, should be decoration, subordinate in texture, line and color to the figure upon which it is to be worn. All of this thought will, however, lose its value if we

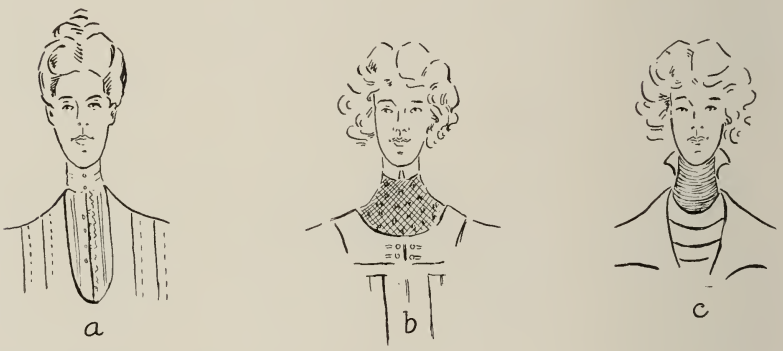


FIG. 1

fail to take into consideration the occasion for which the costume is intended. For instance, a figure perfectly gowned for an afternoon or evening reception would be a gaudy show if seen on the streets in the morning.

If we were all built on perfect lines we could, without exception, follow the rule that, in the main, decorative lines should follow and strengthen structure; but, as few of us are so constructed, and as similarity of line and shape intensifies bad as well as good characteristics, the best that we can do is to avoid or modify bad lines and repeat and strength good ones. A tall angular figure in pronounced vertical stripes appears emaciated, whereas the use of a soft plain or figured material which has nothing in its make-up to emphasize vertical structure will

tend to bring out the cross-lines, a tendency which will be heightened by the material being of a light, fluffy texture which seldom or never lies in straight hard folds, but stands out from the body and adds to its breadth. Materials striped or figured with a vertical tendency will do much to lengthen a short or stout figure, providing the design be not too pronounced or the stripes too widely separated. The texture of the material should be such as to lie in straight flat folds, thus emphasizing vertical structure.

FIG. 2

WORKING OUT THE DOMINANT LINES OF THE COSTUME TO ACCORD WITH THE DOMINANT LINES OF THE FIGURE.

A thin angular face, Fig. 1, a, should avoid having the defect accentuated by repeating it in the neck and yoke lines.

Contrasting lines, if not too violent, Fig. 1, b, will do much to correct this defect.

If the lines of the face are repated they should be modified by a second line, Fig. c. The hair may also be arranged to help out the shape of the face.

The broad, blunt face may be lengthened by the use of gradually contrasting lines, Fig. 2, b and c.

In Fig. 3, a, b, c, d, e, and f are shown examples of neck and yoke lines which may be used to modify the lines of the face; g, h, i and j, Fig. 3, are examples of lines which intensify the already bad lines of the face.

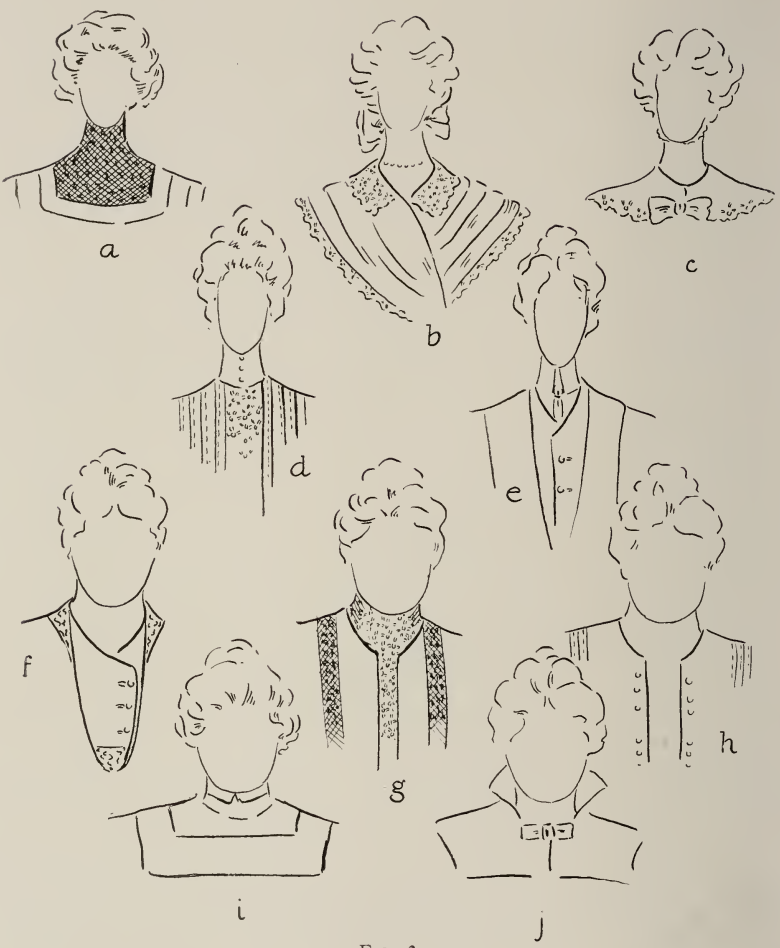


FIG. 3

LINES ECHOING LENGTH LINES ARE ESPECIALLY GOOD FOR THE STOUT FIGURE.

Breaking up into well related vertical divisions tends to lengthen the figure, Fig. 4, a and b.

Avoid the use of cross lines, fullness, trimming about the hips, Fig. 4, c, or very narrow panels on a stout figure, as they all apparently add width.

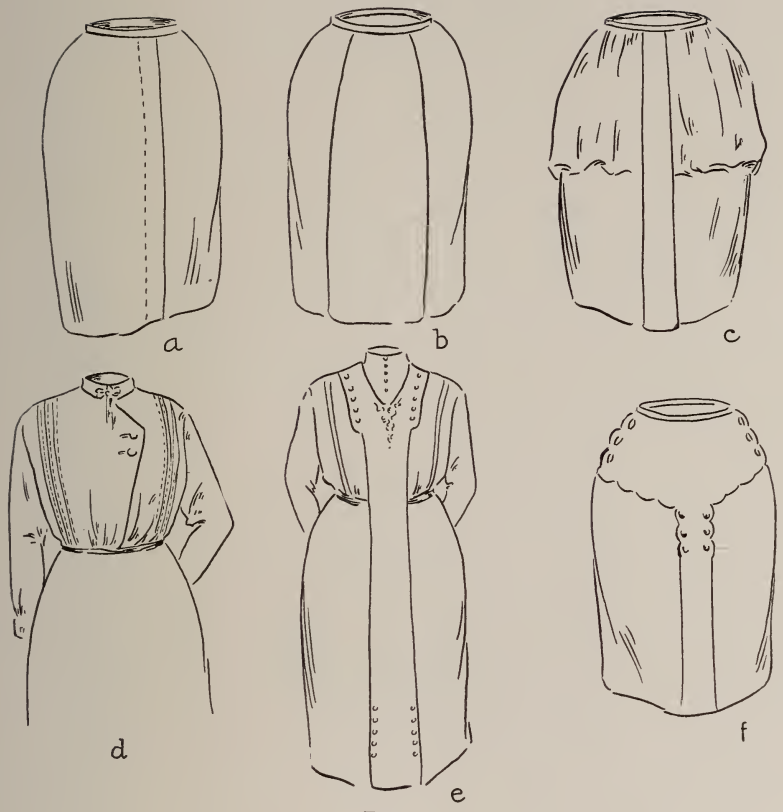


FIG. 4

Vertical divisions on exact center line, Fig. 4, b and c, should be used only on slender figures.

Long continuous lines, Fig. 4; e, are especially good for stout figures, as they lay strong emphasis on vertical structure.

A narrow belt should be used for a stout figure.

There should be as little emphasis as possible on vertical structure, when the figure is over slender, Fig. 5, a. Well spaced horizontal divisions are especially good for the slender figure, Fig. 5, b, c, and d.

A wide belt line may be used to shorten a very tall, long-waisted figure, Fig. 5, e.

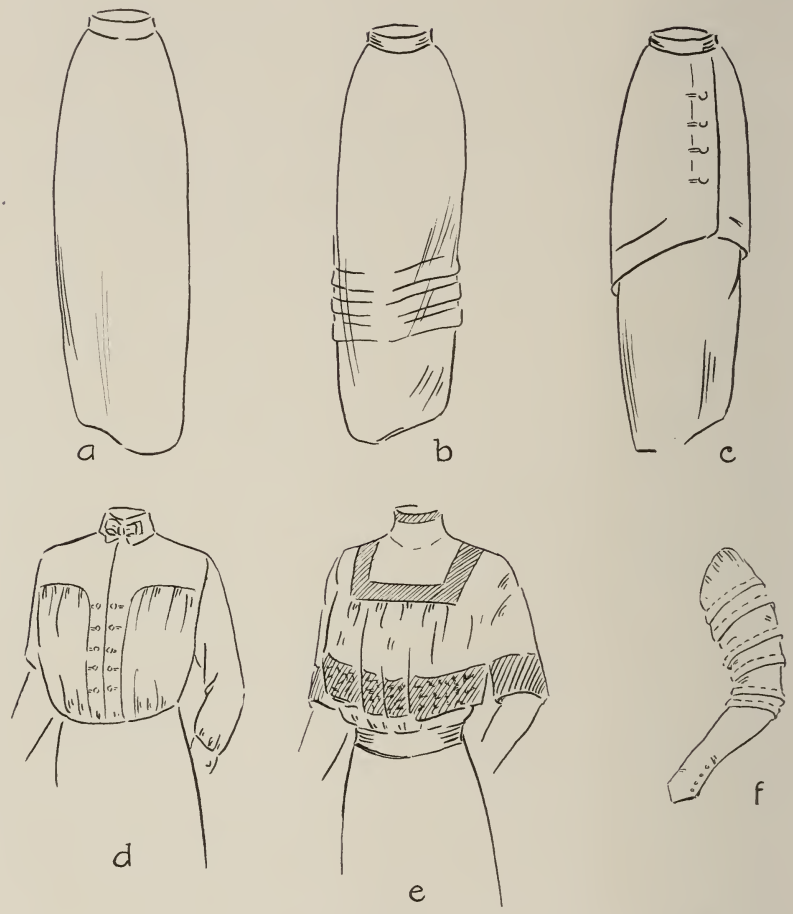


FIG. 5

Since the length of the arm so much exceeds the width, many cross divisions equally spaced, may be used, Fig. 5, f.

THERE MUST BE UNITY OF SOME KIND IN EVERY COSTUME, EITHER UNITY IN LINE OR UNITY IN COLOR.

Fig. 6, a, is violent in both line and color. It is violent in line, because the lines do not support the structure, a defect which is greatly

magnified by violent contrast in color. Violence of line may be made less conspicuous by unity in color, Fig. 6, b. When lines are in harmony with the structural lines of the body, more violence in color may be used.

FIG. 6

BELTS AND TIE ENDS.

Structural lines in ties should echo the structural lines of the body, and length of tie make good space divisions between neck and belt line, Fig. 7, a, b, c, d, e, f, and g.

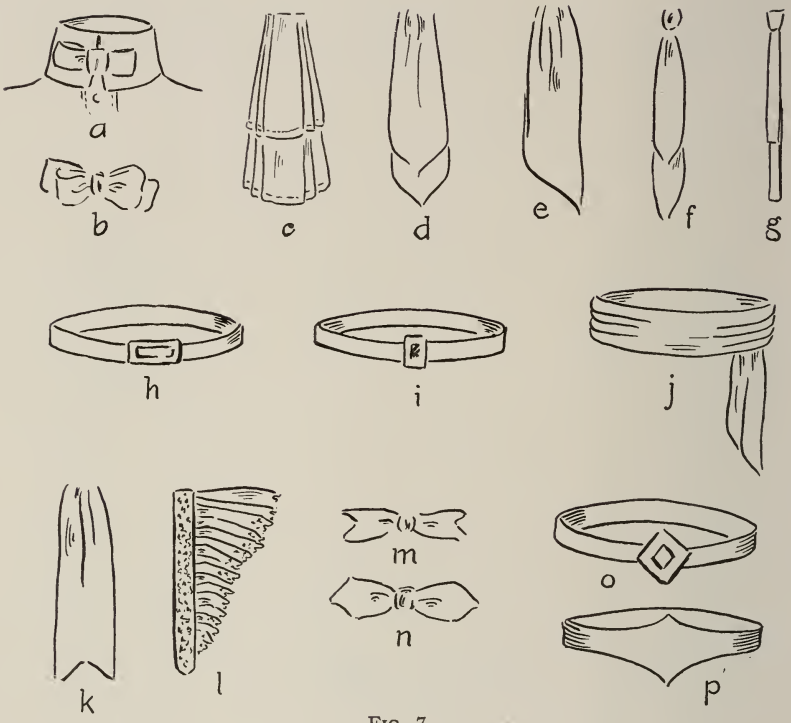


FIG. 7

Structural lines of belts and belt buckles should also be in accord with the lines of the figure, Fig. 7, h, i, and j.

Violent opposition of line attracts too much attention and does not support structure, Fig. 7, k, l, m, n, o, and p.

MANUAL TRAINING IN PORTO ALEGRE, BRAZIL

HAROLD E. EVERLEY

IS a city on seventy hills ten times as interesting as a city on seven hills? If so, Porto Alegre, Brazil, is one of the most interesting places in the world, for it is built on scores of hills, and thru it run five rivers. In this city is located the largest government school of the country. The name in Portuguese is *Escola de Engenharia.*

While there is a general head, the school is composed of several distinct departments. Each section is entirely independent of any other, and work done by one department for another is paid for at regular commercial prices. Courses in preparatory, vocational training, engineering, medicine, agriculture, and many other subjects are given. The school buildings are large and beautiful.

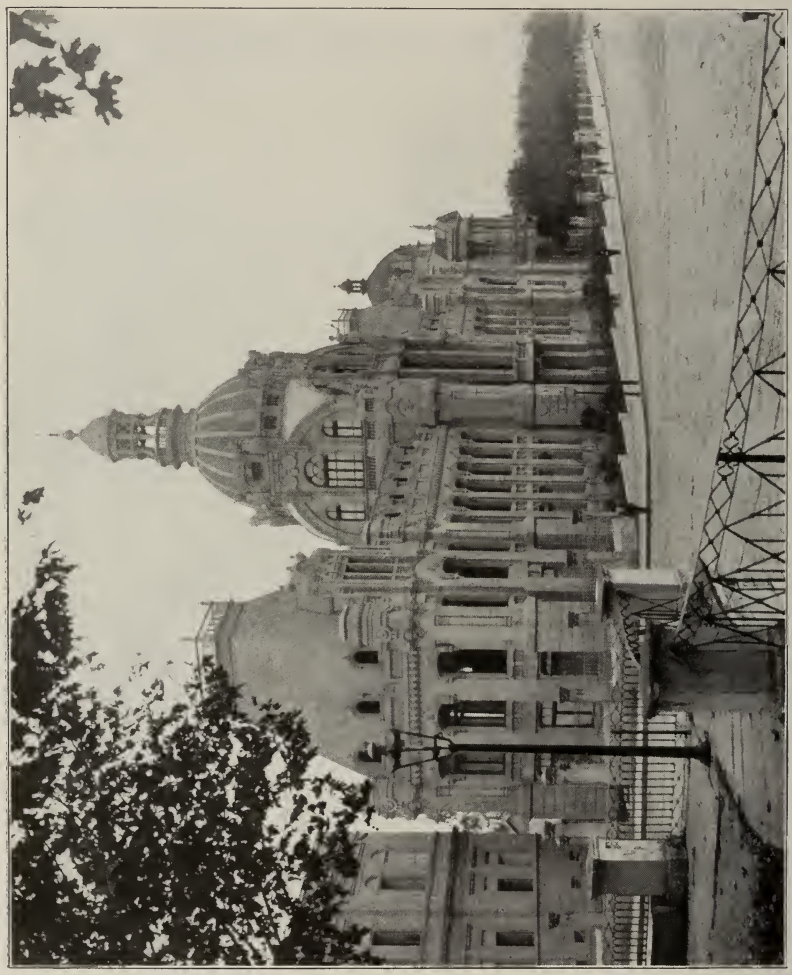
Manual arts in schools is comparatively new in Brazil. It was introduced in Porto Alegre by teachers from the United States in 1912. The subject is taught in all grades with success, altho the problem of selecting work and subject matter suitable to the pupils is a difficult one, because of the various ages and abilities which must be considered at one time.

The students are not graded as in the United States schools. As the public school system is not well organized, class age is not uniform. Boys six years of age may be found in a class with those of twelve, and boys twelve years of age with young men of seventeen.

The preparatory, which resembles a private school for boys, offers the manual arts course. The work is divided into two parts, elementary and advanced. The elementary division includes the first four years, and the advanced the remaining five.

Miss Vera E. Withey, formerly of the Manual Arts Press, Peoria, Ill., has charge of the elementary division. Drawing, paper-cutting, clay-modeling, cardboard construction, and elementary bookbinding are taught. The school furnishes plenty of the best material with which to do the work.

H. D. Wise, of the New York University, is instructor in the advanced department. The course includes bench work, design, drawing, carving, and principles of furniture construction. About one hundred students are enrolled in this section.



PREPARATORY SCHOOL OF THE ESCOLA DE ENGENHARIA PORTO ALEGRE, BRAZIL.

The equipment for this department is excellent. All shop furniture was built according to specifications of the instructor. The unfinished work case and model case are combined. The lower section for unfinished work has drop roller curtains, and the display case above has glass doors. There are also a power saw, a grinder, and trimmer in the shop.

A CLASS IN CHIP CARVING IN ADVANCED MANUAL ARTS, PREPARATORY SCHOOL, ENGENHARIA, PORTO ALEGRE, BRAZIL

The work is much like that done in the United States. Each class is given three forty-five minute periods per week, and is composed of not more than twelve students. When a pupil pays for the material he is permitted to take home his finished work. Many of the problems which are most pleasing in the United States can not be used here. Mission furniture, for instance, is not liked because of straight lines and lack of decoration.

Brazil is now introducing manual training in other schools. Some work is being done in Rio de Janerio and Sao Paulo. Porto Alegre, however, is the most advanced. The school authorities are much pleased with the work, so much so that in the near future they expect to add metalworking and wood-turning to the present course.

EDITORIAL

IN the September number it was stated that the editors of this magazine were planning to present from time to time a few brief propositions which, it was hoped, would make clear beyond doubt the attitude of the staff on certain important questions relating to public education. Such propositions would, of course, be "subject to change without notice," but at the time they were published they would suggest to the readers the point of view of the men who write the editorial column. Following out this plan we now submit seven propositions, as follows:

This magazine favors:

1. A unified system of school administration.

2. National and State aid in order (a) to equalize educational opportunity and (b) to stimulate experimentation in the field of vocational education.

3. Departmental instruction and promotion by subjects in all grades above the sixth, whether the organization of the seventh and eighth grades take the form of an intermediate school, a junior high school or remain as the upper two grades of the elementary school.

4. Making some of the high school courses in towns and the smaller cities more definitely vocational by offering technical and manual arts courses in direct preparation for earning a living as well as in the itnerests of a broader culture.

5. The establishment of vocational schools or departments of existing schools to meet the needs of the larger cities and sections of states, to be supported in part by the city or section and in part by the state.

6. The development of schemes of industrial education which proceed from accurate and detailed knowledge of the conditions in the industries and occupations concerned. To this end further analysis of the processes and organization of specific industries should be encouraged.

7. More time given in grammar and high schools to instruction in the manual arts, and especially in the case of certain classes or individuals.

—C. A. BENNETT

Tradition vs. Ideals

In a recent address Mr. Roosevelt used the expression, "Flintlock methods in these days of high pressure business." The comparison can well be applied to many of our social and political institutions of today, but to none better than our

public schools. In effect our schools are doing what they have done for half a century. Tradition has decreed that college, preferably the classical college, is the goal of all education, and the energies of the public schools have been, and are still largely directed to this end, practically ignoring the application of education to marvelously changing social conditions.

Our High Schools, in revolt against tradition, are gradually coming into their heritage in the development of splendid technical and commercial high schools, but the effect of tradition upon the elementary schools in demanding that their principal function shall be to prepare pupils for later classical education still obtains, with comparatively little protest from educators. The dominating influence of colleges has fixed upon the elementary school, courses of study and methods of teaching which are abstract and unrelated. They are concerned first and foremost with logically arranged principles and methods, and their so-called practical application has little in common with the concrete knowledge and experience of the child. School work comes to the child from without, in the form of abstract facts which have no place in his life or experience.

But new ideals in education are struggling for recognition. It is true they are advocated by only a few of the most progressive educators and as yet have had comparatively little influence upon public education. Under the more liberal interpretation of the aim of elementary education the future of the child and not of the college receives first consideration. It is admitted that all children cannot get a college education and that the type of education that leads to this end may not be the best preliminary education for those who do not wish, or cannot hope to attain to a college course. It is even questioned whether there are not other methods in early education, that will lead at least certain types of youth more directly to higher education, than those fixed by tradition.

The newer idea in education recognizes the child not merely as a receptacle of facts and principles unrelated to his personal interests, but as an active living being with interests and experiences of his own, which are to be factors in his education, and which may become vital factors if thoughtfully directed as educational means. The new thought recognizes the child in school as actually living rather than as preparing for life. School subjects and principles underlying them find concrete application in the experience and necessities of child life.

Under these conditions the schools compass the social functions of life. Activity, expressed in play, business and industry, becomes the

important educational factor about which the interests of school life center. Number, language, reading, geography and history are of interest to the child because he realizes that they contribute to his immediate success in things that appeal to him as desirable.

—W. E. Roberts

The 6-3-3 Plan

The possibilities of the so called 6-3-3 plan of organizing the public school system should be of especial interest to the promotors of manual and industrial training.

The general features of the plan, a plan substituted for the usual division of eight elementary grades and four high school years, commend it to those who administer public education because economy in expenditures and efficiency in education are promoted thereby. Specifically the plan secures considerable improvement in the work of the last two years of the grades and the first year of the high school by avoiding much duplication which is now commonly found in those years, and also by bringing the elementary and high schools closer together by a more apparent unity of purpose.

The plan makes for economy in expenditure because it utilizes to the full the elementary school plant before assigning pupils to the more expensive high school. The per capita cost in the high school is frequently two or three times as high as in the grades and this higher cost can be avoided, or at least reduced, in the case of those pupils who spend but one year in the high school, a year too often of misdirected effort and of meager accomplishment.

Educational efficiency will be promoted by giving to these particular children a more appropriate and purposeful education than they find in the regular freshman class of the high school. In this year the lack of success is frequently the result of the indefiniteness of the purpose of the high school curriculum or the inappropriateness of it for those pupils. This unfortunate condition is often made even worse by the misapplied energy of the high school teachers who are too frequently specialists in their subjects, rather than well trained teachers. They are too commonly without the professional training which the upper grade teachers have had in normal school, a training which should make the teacher more interested in the child than in the subject. Missing the care and the interest of these well prepared teachers, many of the children find the first year of the high school meaningless and wholly unsatisfactory. This condition is greatly improved by the 6-3-3 plan, which in a way

prolongs the pedagogical *methods* of the elementary grades, while bringing earlier to the pupils some of the more interesting *subject matter* now reserved for later years.

Under the present arrangement the work of the eighth grade is frequently rendered less valuable to the pupil because its organization is unsympathetic to his individual needs and characteristics. The main purpose of that grade seems to be to select the pupils thought to be competent to do the work in the high school, or perhaps, we should say, to eliminate those who are not so qualified. For this reason much of the time which might be spent in genuine education is wasted in attempting to fulfill the requirements of admission to the high school. The 6-3-3 plan postpones this process of selection and makes the ultimate transition more natural and perhaps more frequent.

Frank F. Bunker, in his report to the Board of Education of Berkeley, California, some two or three years ago, set forth convincingly the physiological, psychological and practical reasons for this new plan of organization. He said:

> In the "introductory high school" there would be congregated the seventh, eighth, and ninth years. These years comprise another natural group, inasmuch as children would enter it at the beginning of the period of adolescence, when by nature they naturally crave an opportunity to dip into a wide range of subjects and activities, which is Nature's way of insuring a freedom of choice in determining occupation, and somewhat of intelligence in the same. I would have certain prescribed subjects for this group, but in addition thereto would permit as many electives as possible, thus making it unnecessary, as at present, for every child in the seventh and eighth grades to take exactly the same work as every other child. In contrast to the work of the first six years, I should wish to see the work of this group made exceedingly rich in content and variety, and particularly in human interest. I should hope to see the work of this group relate very closely to life and be as far away as possible from that which is purely academic in education. * * * I should wish to see the work of this group shaped up to make a more easy transition from the work of the elementary grades to the departmental work of the high school. In line with this I should wish teachers assigned to work in these grades who have a broad culture and wide experience in teaching in the grades.
>
> By an arrangement of this kind it would seem that the work of the high school proper could be made more intensive than it is at the present time, with higher standards of scholarship and more rigid requirements than at present obtain, and without working any hardship upon the young people who enter the same; for it would seem that if this work which I have outlined be carefully and efficiently done, that the incoming student will have developed a much more serious attitude toward his work than obtains at the present time, will have

oriented himself better, so far as his subjects are concerned, and that the break will not be so great or so discouraging as with the plan under which we are now working.

This new organization will enable teachers of the manual and industrial arts to secure for the concrete minded children in grades seven to nine more varied and extended work in the constructive activities than would be possible under the restrictions of the prevailing plan. The manual training work of the ninth grade could be an extension of that of the eighth instead of having to justify itself on some new basis, as is now commonly the case.

At present it is difficult to induce certain children to go to the high school, and when they do go they too frequently find little that administers directly to their peculiar needs. Those children, for example, who, on account of economic conditions usually leave school at the end of the eighth grade and who need a genuine industrial education, could undoubtedly be retained for an additional year much more easily under the 6-3-3 plan since it provides opportunity for widely differentiated and more flexible courses in the intermediate grades, that is grades seven, eight and nine.

Roughly speaking these years cover the ages from thirteen to sixteen. It should be remembered that these are the years for which prevocational work is most appropriate, and also that prevocational work is frequently an outgrowth or extension of the seventh and eighth grade manual training, enlarged as to purpose and increased as to time. For these reasons, if for no others, all teachers of the manual arts should rejoice that the 6-3-3 plan is rapidly gaining the approval of educators generally. —Frank M. Leavitt

Short Unit Courses

Our paragraph on possible danger in short unit courses, published in the October number, called forth several letters from the city of Pittsburgh, where what are termed unit courses are given in two elementary industrial schools. We are glad to quote the following from a letter written by Frank H. Ball, director of industrial education:

We do not feel that the unit course has helped to pull students into our school, but we do know that it is an immense factor in holding these fourteen to sixteen year old boys in school; that our work, in order to be a short unit course, must be sequential, and while in many cases the preparation leads only

to a job, yet they go into that job skilled and trained to a certain degree. A great many of them are simply using the job as a stepping stone to earn a living and supplementing that living by night school work with the ultimate intention of going to a technical school and getting a higher education. For example: One of our popular courses is practical electricity. The work is laid out in sequence, going from the simple to the difficult, each unit being in advance of the other and the goal may be called a job as an electrician. After they get that job, I, for one, feel that it is anything but a blind alley occupation; that it opens their eyes to possibilities beyond, and the intensified training which they have received during two years in our school broadens their vision and makes them determined to push on and get higher in that occupation. We seldom speak of the money value of the training to the boys, but we do speak of the job as being something worth striving for and attaining.

Our sheet-metal graduates are not journeymen, but they are far in advance of any boy who has spent two years in the commercial shop getting what he can under commercial conditions. The same will apply to our printing boys and our electrical boys, and it is a fact, known among some electricians, that our boys are capable of doing better work than some electricians who have been employed by the Board of Education at journeymen's wages.

We do not use the unit system to increase our enrollment, because our schools are crowded to overflowing, but are using it to hold the boys in school until they can graduate, and we are accomplishing that purpose right along.

If the courses mentioned by Mr. Ball are properly called short unit courses, and if the success in holding pupils in the elementary industrial schools of Pittsburgh is chiefly, or even in large part, due to the system of arranging the courses, we say, let us have more short unit courses in such schools. —C. A. Bennett

OF CURRENT INTEREST

A BATTLE-SHIP has been changed into a "Christmas ship," a ship to go from our American children to the children of the European war zone; a ship filled with play things and useful things; a ship whose cargo is happiness and Christmas cheer!

All over the country the school children in the manual training and sewing classes, and even at home, have been working for weeks with the greatest enthusiasm to fill the "Christmas ship." At first thot it seems impossible that they could make enough things to fill a battle-ship, but when one thinks of the thousands of children in kindergartens, grammar schools and high schools, and then when one hears details of the zeal, self-sacrific and industry shown by them in the making of the gifts to go into this "Christmas ship," one wonders whether, even with every nook and cranny filled, one battle ship will hold them all.

THE SCHOOL SHOP AND THE CHRISTMAS SPIRIT

When the children of the Francis W. Parker School, Chicago, came to school one cold snowy morning in late November, they saw everywhere posters like this:

WANTED—WANTED—AT ONCE

Wanted at once good workers in the following trades:

25 *Mechanics*—Must have a good knowledge of auto repair work, aerial machines, boats, engines (both stationary and locomotive), clock-work motors, agricultural implements, wagon repairs, etc.

20 *Painters*—Good at retouching. Must have experience in mixing and judging colors and be able to handle brushes well.

20 *Surgeons*—(In hospital). Skill especially needed in grafting arms and legs and replacing old heads. Those with previous experience in either hospital or private practice preferred.

10 *Veterinary Surgeons*—A good knowledge of the anatomy of dogs, teddy-bears, and horses is necessary.

10 *Block Repair Men*—Neat and careful workers, able to handle needle and paste brush well.

10 *Repair Men*—For the same department.

20 *Wrappers and Packers*—For packing and shipping department. Only neat workers need apply.

1 *Foreman and* 1 *Inspector* in each of the following departments: *Mechanical, Painting, Hospital, Book Repair, Game Department, Wrapping and Packing.*

Application may be made in person or by letter. Steady work promised from now until December 20. *Good Hours, Good Wages.*

SANTA CLAUS

P. S.—This is my busy season, so I have appointed Mr. Wahlstrom superintendent of my Annex Shop at the Francis W. Parker School. Particulars may be obtained from him or from any of the teachers in said school.

Applications should be in by December 1.

One can easily imagine the giggles and grins of the children grouped around these posters, as the fun of the thing became contagious. At the morning exercises the children were let into the already half-told secret. Their suspense was ended, but not so their excitement, for they were to become the accomplices of Santa Claus, or the Christmas Spirit of Giving.

The manual training and sewing rooms soon became veritable repair shops for broken toys. They were true shops, with groups of younger children working under the direction of older ones as foremen. The broken toys were classified according to the kind of repair work needed. Simple painting and pasting were given to groups of children in the first grade, while the soldering, tin smithing, and the putting of life into mechanical toys were relagated to those of the eighth grade or high school. Each child, instead of performing all the process, did the work he was best fitted to do. The pupils seemed to appreciate the value of putting the work on a factory basis, when the time was so limited. Each worker in this Santa Claus Annex Shop kept a time-card. Later these cards showed how enthusiasm grew, and how many extra hours were spent in this shop, tho the original plan had been to have the shop running only two days a week after school hours. Great care was taken by the "shop hands" to have their foreman O. K. their time entries, so they could get a big check from Santa Claus. For every hour of time meant a wage of five happy days payable by "Father Time's Bank of Discount." The possessors of these checks prized them as much as tho they represented actual cash.

The games and puzzles needed much the same treatment as the books, and so several members of the library force acted as advisors to

[1]From an article written by Leonard Walstrom in the Francis Parker Year Book, Vol. 1, 1912.

the foremen in this class of repair work. In many an instance, as a child rubbed off soiled finger marks with pumice stone, or replaced loose leaves, or mended torn pages he began to appreciate the value of treating a book well. The books beyond repair were cut up for scrap book material.

While the boys were doing all these things the girls were making new dolls out of old, or parts of old ones. Pretty new clothes, freshly painted complexions and well brushed and curled hair completed the transformation. Some of the older girls who had outgrown their dolls brought in minature wardrobes which, when freshly laundered by the children, were used in dressing the dolls.

One of the busiest departments, especially at the close of the season, was the Wrapping and Packing Department. Here hundreds of common boxes had been beautified by the children of the second, third, and fourth grades, with pictures, bits of wall paper, or completely covered with bright colored papers.

Altho much joy in making others happy went into the work of this Santa Claus Annex Shop, real heroism was shown by many a child in response to the suggestion that it would be showing the Christmas spirit to give some treasure that was still dear, so as to share part of ones pleasure with some girl or boy that otherwise would have no doll or toy on Christmas. One little girl came hugging two dolls, which bore traces of much loving care, and handed them over with the remark that "they just *had* to go to the same mother," showing that she was parting with a beloved treasure.

CHRISTMAS TOY REPAIR SHOP

An interesting experiment was carried on in the Washington Industrial center of Seattle last Christmas, and while the idea may not have been entirely original, yet the way it was carried out should prove of interest to many. I refer to a Christmas toy repair shop. Two weeks before Christmas, the principal, Mr. G. A. Stanton, suggested to Mr. Olson, the shop instructor, that he ask his boys to bring any old broken toys they might have in their homes to the shop to be repaired. Mr. Olson entered into the scheme with enthusiasm and it was not long until quite a collection of toys were piled in the shop. Everything was systematically arranged and carried out. The first thing was to sort the toys into different groups and this was done as follows: Into one

REPAIRING TOYS FOR SANTA CLAUS, WASHINGTON INDUSTRIAL SCHOOL, SEATTLE

group were placed all toys with mechanical defects; into another those needing painting and staining; into another those needing soldering; and into still another those having broken wooden parts; and, finally, the fifth group contained broken plaster of paris toys.

HELPING SANTA CLAUS IN THE GIRLS' DEPARTMENT
WASHINGTON INDUSTRIAL CENTER, SEATTLE

To carry on the work in these groups a foreman was elected for each of them. These boy foremen divided up the rest of the class into "gangs" and the real work of helping Santa Claus began. Much real ingeniuity was displayed by all, especially the foremen. The boy at the head of the plaster division constructed a set of tools from ten-penny nails, and the others were not behind him in meeting any difficulty that presented itself.

It was not long until the shop ran out of work. Every toy the boys possessed was mended, and so it was necessary to get materials from new places or close the factory. At this time someone suggested that the large department stores be asked for any broken toys that they might have left from their stocks. This was done, and sackful after

sackful came from this source. Capitol Hill, a wealthy residence district, contributed three large auto loads, and from still other sources toys piled into the shop. Most of these were satisfactorily repaired.

One interesting fact about the experiment was the earnestness the boys displayed in their work, the very nature of which would tend to create disorder. To a visitor entering the shop, confusion apparently reigned supreme. Autos were spinning across the floor, aeroplanes flew thru the air, jumping jacks popped out of their green and red boxes. This, tho, was only the confusion of any hive of industry. Each boy was intent upon his own work and nothing else. Each boy had a task to master, to make a train run, a mule kick, or a mouse squeal, and to this task all energy was devoted. There was no time to watch Johnny's auto, or some other boy's performing monkey. Everyone was busy.

Perhaps the greatest good resulted from the disposition of the repaired articles. It was here that the real Christmas spirit manifested itself. The boys of the center had a reputation of being "tough," and as a rule many of them were into all the meanness imaginable. These boys, however, took it upon themselves to see that the poor children of the neighborhood were supplied with toys. In some cases the boys walked blocks on Christmas eve to deliver presents, and they took pleasure in doing it.

The boys could not, however, begin to dispose of the enormous quantity of toys that they had repaired. Over 2,600 different articles were put into working order during the two weeks the experiment was carried on. Many of the charitable organizations of the city were notified, and they sent wagons to be loaded with toys for the children under their care.

The girls came in for their share, too. Hundreds of dolls were given new wigs, dresses, shoes, and in some cases their faces were painted in true feminine fashion.

Thus the children of Washington center learned that "it is more blessed to give than to receive," and the Christmas spirit entered many hearts that before had never known the true joy of giving.

—Edward G. Anderson.

ANOTHER SANTA CLAUS SHOP

The Santa Claus shop idea is not confined to large cities any more than the Christmas spirit is circumscribed by city walls. The accom-

panying photograph received from W. W. White, of Independence, Ia., shows a corner of another school shop that caught the Christmas idea and for a short time organized as a factory to repair toys which were turned over to the local relief society for distribution.

A NEW DEPARTMENT AT INDIANA UNIVERSITY

The department of Industrial Education was established in Indiana University by action of the Board of Trustees of the University in June, 1913. Class and shop work in wood were begun at the opening of the Fall Term, September, 1913. To meet the increasing need for teachers and leaders in vocational education in Indiana, it was decided in the spring of 1914, to employ a director for this department. Robert J. Leonard, formerly supervisor of industrial arts in the secondary schools of Teachers College, was employed in this capacity. While the plans for the department are still in the formative stage, the following indicates in a general way the contemplated lines of developmen:

1. As the department is primarily organized for the training of teachers and leaders, rather than for technical workers and engineers, it will be organized as a school of the department of education.

2. Adequate provision will be made for the training of teachers and leaders in the field of vocational education by providing shop, studio, and laboratory facilities; courses in the typical industries, courses in the theory of teaching vocational subjects and the organization of vocational schools; opportunities for first-hand study of modern industrial processes and thoro observation of industrial concerns, and cooperative participation in industrial practices; opportunities for school observation and experimentation, and opportunities for making social and industrial surveys.

3. Provision will be made for the continued training of those already engaged in vocational education by correspondence courses and by University Extension courses.

4. Provisions will be made for the selecting and training of selected groups of journeyman workers for vocation teachers by establishing evening extension courses in the various centers of population. This course will be localized where state-aided vocational schools have already been established, and these schools will, for teacher training purposes, be used for purposes of observation and experimentation.

VOCATIONAL AGRICULTURAL SCHOOLS

Commissioner Carris, of New Jersey, has outlined a plan for county agricultural vocational schools similar to those now found in several other states. "The proposed schools will give definite instruction for apprentice farmers." Such a school may be organized as a department of any high school, with this difference, however, that the vocational school must be open to any student who has reached the age of fourteen, provided he has completed at least the fifth grade of the elementary school.

The vocational agricultural school will begin in September and close in June, but the work on the home farm will take precedence whenever the tasks there require. Because there are fewer demands put on the children at home during the winter months, that will be the time when the school will teach the science of agriculture. Much of the difficulty of irregular attendance will be overcome by offering short courses. These short courses will supplement the effective work now being done in farmers' institutes and at the state agricultural college.

The teacher in agricultural vocational schools will be employed for the entire year, with a short vacation in the winter months. During

the summer months, or as soon as the farm activities begin, the teacher will supervise the boys in their work at home. The father who sends his boy to a vocational agricultural school must agree to give to the boy on the home farm a few acres on which to raise crops.

THE RESULTS OF AN INVESTIGATION

At the regular meeting of the County School Board Association, held in the city of Perth Amboy, January, 1914, a resolution was passed to appoint a committee to investigate the necessity for, and to consider the advisability of recommending the establishment and maintenance of county vocational schools and to submit the findings in a report to the Association.

Such a committee was organized in April and apportioned among its members the following lines of investigation:

1. To ascertain the number of pupils leaving the elementary schools of the county during the last school year before completing the eighth grade, and to learn the character of the work in which they were employed.
2. To ascertain the number of industries likely to employ pupils who had received training in the county vocational schools and the general attitude of manufacturers toward the establishment of said schools.
3. To find the probable cost of the equipment for such schools.
4. To select the most suitable and useful locations for such schools.

The committee reports that during the past year 232 pupils left the county schools between the 5th and 8th year for home work, 447 for factory work, 114 for store work, 60 for farming, 260 for other kinds of work, making a total of 1,113 pupils.

The committee communicated with 60 manufacturers, finding that 54 out of the 60 were favorable to the establishment of county vocational schools.

The committee reached the unanimous conclusion that there is necessity for, and there should be established and maintained county vocational schools, and recommended that the necessary steps be taken. The full report of the committee has been printed in the school print shop at Perth Amboy.

TAKING THE SCHOOL TO THE HOME

Cooking in real kitchens is the new thing that is being tried out at the North Bennet Street Industrial School, Boston, Mass. It has been arranged with the mothers in the neighborhood to allow small classes of girls and their teachers to have cooking lessons in their kitchens. Here the girls will meet just such conditions as they have in their own homes, or can easily have. It is hoped that these lessons will show the girls how to work at home, and that at the same time the mothers will gain enough confidence in what their daughters are learning in school to allow them to experiment at home, and still further, it is hoped that in cases where it is needed the mothers themselves will incidentally learn much that is valuable.

Being an institution operated by private funds for the purpose of working out ideas in education for the benefit of the community—an educational laboratory—this school is in a position to do what other schools cannot.

George C. Greener, the newly appointed director of the school, is placing emphasis on the elementary industrial work. There are two such classes in the school, one for boys and one for girls, which provide for one hundred children. Mr. Greener succeeds Alvin E. Dodd, who resigned three months ago to accept a position with the National Society for the Promotion of Industrial Education. Mr. Greener has been connected with the school for five years as a teacher of manual training. later becoming assistant director.

PUTTING NEW LIFE INTO RURAL SCHOOLS

"Little Farmers of Cook County" is the title of an article in the September *Craftsman,* by Robert H. Moulton, which tells what Edward J. Tobin, superintendent of Cook County, Illinois, and his co-workers have been accomplishing in the rural schools. Because Mr. Tobin realized that boys and girls in the country schools have been struggling with problems designed for city schools, he has brought the farm problems into the schools. He has divided Cook county into five sections, each section containing not more than twenty-five schools. At the head of every section he has placed an expert with the title of "school and rural life director." So far as possible each of these men is not only a trained and successful teacher, but a graduate of an agricultural col-

lege, and possesses the qualities of social leadership and organization. Each director is paid a salary of $2,000 a year, and is on duty 365 days. The summer vacation is probably his busiest season. Every boy and girl is taught how to select seed and how to test it by either the "rag doll' method or with germination boxes. They learn how to care for poultry and send eggs to market by parcel post; how to prevent waste by canning fruit and vegetables; how to get the best results out of kitchen gardens, and other scientific farming methods that save money, time and energy.

When the children come to school in the fall a seed testing club is organized. Their fathers are asked to lend to these youthful scientists the seed corn saved for the next spring's planting. The boys make the germination boxes and the girls the coverlets for them, the children doing the buying of materials and the planning. After the seeds are in the box ten days, it is opened. Often the farmer is quite surprised at the facts recorded by the children, but one glance in the box verifies them.

In the spring, acreage clubs are formed. The father of each boy is asked to lend his son an acre of good land. All the ordering, planting, and cultivating is done by the boy himself, under the guidance of the school and the "rural life director." Arrangements are made that the boy is to have the proceeds from the sale of the produce. Incidentally a hard-headed and conservative farmer frequently gets a valuable lesson in up-to-date methods.

The poultry clubs have solved the "fresh egg problem" of Chicago by making it compulsory for each member to set his club number, the number of his school, and the date on each egg, which is placed in a box marked with the name of both club and school, and delivered to the consumer by parcel post.

SHOP NOTES AND PROBLEMS

ALBERT F. SIEPERT, Editor

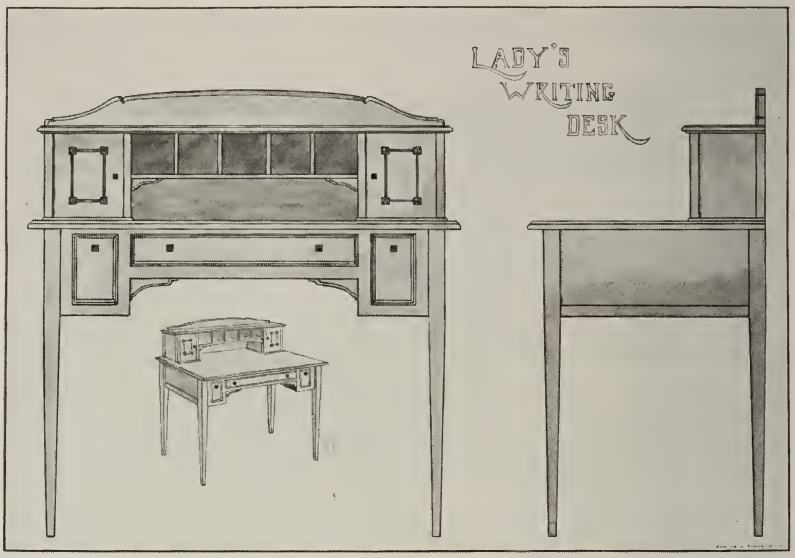
The material presented this month was contributed by members of the Department of Manual Arts of Bradley Institute.

JARDINIERE STAND

The drawing for this project is found in Griffith's *Correlated Courses,* page 208, and general dimensions were followed. The student's problem was to modify the original design and to produce by hand tool processes a piece lighter in appearance and decorated in harmony with its intended use. The first was accomplished by minor changes in proportions and spacings of rails and slats, but especially by the treatment of the legs, and the second by the designing and inlaying of a conventional flower form of mahogany on the largest slat. This piece is the work of T. E. Jones.

LADIES' DESK

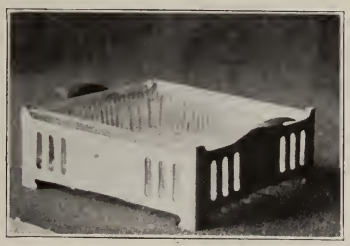
The desk was designed by a student in the constructive design class, and the first illustration shown herewith is a reproduction of the student's own drawing. The photograph shows the finished desk after being made in the furniture making class, with such changes as were found advisable. The material used was white maple, and it was finished with shellac and wax. The drawers on either side are intended for filing letters in their envelopes in a vertical position, while the cabinets are to hold account books, etc. The doors are built up of three ply stock to prevent warping. The molding was made with a hand scraper filed to the desired outline. The inlay was built up of various woods, then cut into cross-sections and glued into places cut to hold them. The design and the project were made by E. G. Anderson.


LADY'S
WRITING
DESK

DESK WEIGHTS

The two desk weights shown are the result of much earnest thought and experimentation in an endeavor to design a problem in iron and steel for beginning high school classes, that embodies the fundamental tools and processes and at the same time arouses and retains the interest of the students.

The body of the weight is of cast iron. The bevels are chipped. All other surfaces are ground to remove the hard casting scale, and then filed true and square. A hole is drilled in the top, and then tapped to receive the knob which is turned of machine steel. The entire weight is polished by hand, and the student engraves his name on it, finally it is nickel plated.



RELISH DISH OR CANDY TRAY

This is a new problem in art metal work. A rectangular, round or oval glass dish is the first requisite, and a paper pattern is formed by bending a strip of manila paper around the dish. On this pattern the outline of the top and bottom are drawn, also the handles, feet and the saw-pierced decoration. In the middle of each side on the bottom there is left a strip of metal ½″ wide, which, when it is bent under, keeps the glass from dropping down.

When the pattern is completed it is glued to a piece of 18 gage brass, copper or German silver and cut out with the saw frame. The seam may be riveted or silver soldered.

—ARTHUR F. PAYNE

UPHOLSTERING A BOARD STRUCTURE

This method of upholstering may be used upon any board structure from a baby cart to a dining room chair.

FIG. 1

FIG. 2

For this foot stool take 3 oz. of tow. Pull it out thoroly and work it into good shape with the hands on top of the stool as seen in Fig. 1. Place a piece of muslin 9″x15″ over this and tack ¼″ from the edges with twenty-five 3 oz. tacks. The muslin should be folded under, and stretched as tightly as possible as each side is being tacked simultaneously from the middle toward the corners,

Fig. 2. Use the regulator, also seen in Fig. 2, to even out any irregularities and to force the tow well out against the sides. Lay over this a piece of wadding 7″x15″, at the left in Fig. 2.

Take a piece of Marokene, brown or black as desired, 7½″x13½″. This should be stretched as tightly and evenly as possible, and tacked with twenty-five 3 oz. tacks. The row of tacks should not be more than ¼″ from the edges of the stool, and the cover should be trimmed to within ⅛″.

A piece of leather gimp 44″ long, colored to match cover, is nailed in place with 1 doz. metalene nails as seen in Fig. 3. The corners are not cut but folded.

—E. A. Johnson

Fig. 3

SPLIT WOOD PULLEYS

New pulleys are needed at times in practically every shop. The accompanying illustrations show two types that have given excellent satisfaction at Bradley Institute. They can be made for the bare cost of materials, and afford a splendid problem for students in machine woodworking.

The pulley shown in Fig. 1 is especially valuable where pulleys of a certain size must be had on short notice. It is of solid, three-piece construction, and will give satisfactory service, tho it should not be used for work requiring diameters over 14 in. or a face over 6 in. The two larger pieces are clamped together by means of lag bolts; the smallest piece covers the heads of the lag bolts and is held in place by round-head screws set below the face of the pulley. The two smaller pieces are sawed apart on a curved line, as shown, to close up the

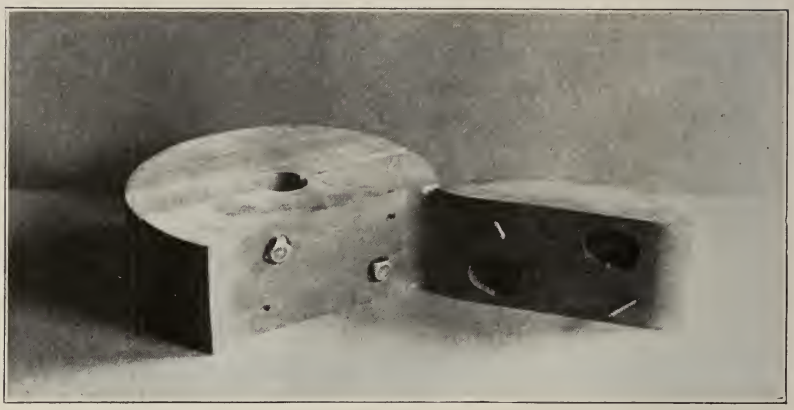


FIG. 1

FIG. 2

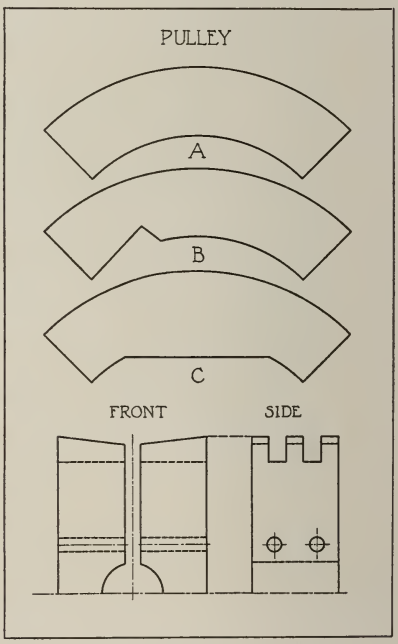


FIG 3

saw kerf when the screws are tightened. The pulley is sawed out on a hand saw, clamped to a mandrel or shaft and turned up true, Fig. 2.

The second pulley is much more complicated, but when completed makes a first-class pulley. It can be made in almost any desired size. Fig. 4 illustrates

FIG. 4

FIG. 5

an 8″ pulley having several loose segments in order that it may be used for demonstration, while Fig. 5 shows a 16″ by 6″ pulley and another measuring 18″ in either direction. These pulleys are made of layers, each layer being composed of four segments. The outer arc is drawn with a radius larger than the

finished pulley by the amount required for turning it true, the radius of the inner arc varies according to the size of pulley and strength required. These arcs are drawn upon the wood to be used and sawed out on a band saw. The first, or outer layer of the pulley is made of four segments, A, the second layer of four, B, the third of two, C, alternating with two, A, Fig. 3. The fourth and fifth layers are repetitions of the second and third, this being continued until the required width of face is reached, except that the last, or outer circle is again made of four pieces, A. The spokes are cut to fit the respective segments, B and C, and put in place as the rim is built up, the two halves being kept apart by a thin board, which is later removed in order to give a good grip on the shaft Fig. 3. When the building up is complete, the pulley is sawed in two on a diameter running thru the space occupied by the thin dividing board, clamped to a mandrel or the shaft where it is to be used by double nut bolts, and turned up true, Fig. 2, with a face square or crowned as may be desired. The inside is usually painted black, the outside finished with one or two goods coats of shellac.

—Harry L. Hurff

THE ENGINE LATHE

This is generally the first machine placed at the disposal of students in machine shop practice. The teacher must be thoroly familiar with the machine if the student is to handle it properly.

In the first place the student must have the different parts and movements explained to him; then he must know how to oil the tool and have the different oil holes pointed out to him, some of which he would not find otherwise.

The head of the lathe should be explained first, emphasizing such items as the use of the back gears, showing how the pulley is clamped to the driving gear on the spindle, cautioning against throwing in the gears while the belt is in motion, and painting out the connection between the driving spindle and the screw and feed rod which draws the carriage along the bed.

The carriage requires more attention, as the students are apt to get confused with some lathes and throw in both the turning and screw cutting feeds at the same time, causing the "shedding of gear teeth." The writer has had but one experience of this kind in sixteen years of teaching. He advises the use of belt feed and change gear for school use. The belt feed offers a chance of the belt slipping if both screw cutting and turning feeds are thrown in at the same time. Moreover, the student should learn how to figure the necessary gears for thread cutting, and he can become more familiar with the moving part of his tool when using the simpler lathe than is possible with the gear driven feed and quick change gears. Some lathes are made interlocking, so that both feeds cannot be thrown in at the same time. For others, careful instruction before the students use the lathe, will avoid trouble in most cases.

After this preliminary instruction, simple problem in turning, facing and thread cutting are in order, each problem requiring the degree of accuracy desired in the finished piece. The student should then be ready for chucking, drilling, boring, reaming, turning tapers, turning irregular forms and such face-plate operations as time may permit.

—W. F. Raymond

REVIEWS

The Book of School Handwork. An encyclapedia of educational handwork subjects, methods, materials, tools, organization, etc., written by the leading teachers of handwork in the British Isles. Edited by H. Holman. Caxton Publishing Company, Limited, London, 1913. To consist of six volumes, each 9½x6½ in., containing about 240 pages; illustrated with line drawings, halftone plates and color plates; price per volume, 8s. and 6d. in London.

We first mentioned this work in our April issue, saying that it was by far the most comprehensive ever published on the details of school handwork. In June we reviewed the first volume. Since that time we have received the next four volumes—all but the last in the series. As the volumes have come, one after another, the magnitude of the undertaking has been appreciated. If anyone has the idea that English manual training is stereotyped, these volumes will convince him to the contrary. In them he finds laid bare some of the best models, and the best methods that the brightest teachers in England have wrought out during the past twenty years or more, and they show great variety. When he realizes that the movement headed by Professor John Dewey in this country has had its counterpart in England, and that science and handwork have been closer together in England than in America, he begins to appreciate how such volumes are possible. It is true that many of the types of work represented in these books are not in the direct line of present development in America. It is also true that some of them will seem like ancient history to some of our American teachers. But it is just as true that many of the types will be new and suggestive to Americans and that some of the methods presented in this work ought to set some of us on this side of the water to thinking.

Volume II contains "Easy Woodwork for Young Children," by Robert Wooton, of Hornsey; "Weaving," by Miss Swannell, author of "Raffiia Work;" "Stripwork," by William Nelson, superintendent of the Royal Schools for the Deaf and Dumb at Manchester; "Metalwork and Household Repairs," by James Boorman, technical instructor to teachers in training, London; "Handwork and Mathematical Geography," by J. W. Page; "Pencil, Pastel and Colour Drawing," by J. Vaughan, director of drawing and manual training in Glasgow; "Auxiliary Metalwork," by J. Scott Knight; "Handwork and the Beginning of Arithmetic," by Miss Dora Walford, lecturer at the Leeds City Training College; "Knife Woodwork," by Charles Bird, superintendent of handicraft in Leicester; "How Handwork was begun in a Girl's Elementary School," by Mrs. J. E. Desborough and Miss C. J. Bygrave; "How I Work my School in Handwork Lines," by J. Arrowsmith, of Halifax; "Practical Educational Handwork in Secondary Schols," by G. H. Woollatt; and "Woodwork in a Girls' Secondary School," by C. Seaman. We would especially commend for American readers the chapters by Mr. Arrowsmith, Mr. Boorman and Mr. Knight.

It seems hardly possible in our limited space to give even the chapter headings in each volume. Volume II seems fairly typical. Volume III begins

with a chapter on "Recent Development in Manual Training with Special Reference to the Teaching of John Dewey," by Dr. J. J. Findlay, professor of education at Manchester University. Later in the volume are "Specimen Lessons," by Charles L. Binns, editor of *Manual Training*; "Paper Modeling for Infants," by Miss Lilian Brown, of the Training College at Swansea; "The Development Brushwork," by the late Ebenezer Cooke; "Systematic Recreative Woodwork," by H. Williams Smith, of London, whose writings are well known to readers of this magazine; "Light Metalwork," by J. Scott Knight; an extensive chapter on "Timber in School Handwork," by John Hudson-Davies; "Handwork for Special Schools," by J. H. Judd, superintendent of handicraft instruction in Manchester; and "Reponsse Work," by J. W. Wilkinson, teacher at the School of Art, West Bromwick.

Volume IV contains an extensive chapter on "String Work," by Miss C. Ferris, principal of the Westbourne House School, Penarth; "Handwork and History," by J. B. Robinson; "Clay Modeling for Infants," by Miss Amy Walmsley, principal of the Froebel Training College, Bedford; "Bookbinding for Schools," by John R. Brown; and others.

In Volume V James Boorman gives a chapter on "Paper and Cardboard Modeling;" Isaac J. Williams a chapter on "An Easy Introduction to Wood-Carving;" J. Scott Knight gives some more of his practical problems in cold metal work under the title "Systematic Metalwork;" Mrs. H. M. Swinbourne contributes the first chapter, which is on "Leather Work;" and Professor James Shelley, of Southampton, discusses "Handwork as a Medium for Artistic Expression."

Any library for teachers of handwork that wants to present the latest phases of manual training development in the British Isles can do so by purchasing these volumes.

Training the Girl. By William A. McKeever; published by The Macmillan Co., New York, 1914; illustrated; 5x7¾ in., 337 pages; price $1.50.

The book is divided into four parts, distinct, yet interrelated; namely, Industrial Training, Social Training, Vocational Training and Service Training. It is a sympathetic and sane treatment of the subject, full of inspiring and practical suggestions for the guidance of the growing girl in the different phases of her life.

RECEIVED

Microbiology Outline. The September, 1914, number of *The Stout Institute Bulletin,* Menomonie, Wis. This outline of about eighty pages is intended especially for the use of students at Stout Institute.

Some Trade Schools in Europe. By Frank L.Glynn, director of trade instruction in the public schools of New Haven, Conn. Published by the U. S. Bureau of Education. Bulletin No. 23, 1914; 80 pages; price 15 cents. This report of a recent European visit to study schools gives most attention to trade schools in Great Britain, tho mention is made of several in the leading Continental Countries.

MANUAL TRAINING
AND
VOCATIONAL EDUCATION

JANUARY, 1915

SUGGESTIONS TOWARD A TENABLE THEORY OF VOCATIONAL GUIDANCE

H. D. Kitson

THE concept of Vocational Guidance has been rapidly developing during the past few years. With amazing rapidity it has been forcing itself upon the attention of all classes of society—upon a misfitted and dissatisfied public who sees in it a possible solution of its individual vocational problems, upon industry which sees in it possible amelioration of numerous economic ills, and upon education which sees in it a means for the fulfillment of its highest responsibility, the fitting of the individual to cope with his environment. In view of the popularity which has favored this movement and of the claims which are being advanced in its name, it is fitting that the concept be examined as to its validity, so that if any part of it be found untenable, a new and more promising hypothesis may be adopted before great mischief is wrought.

Considering vocational guidance as a part of the work of the public school, all agree that its first function is to give vocational information. Its thoro application requires that information be given about a vast number of occupations. Young people must learn what the world is doing before they can decide what part they should play in the world's work. Furthermore, facts should be widely disseminated about the commoner occupations in order that choice may be based upon knowledge, not upon mere guess. This informative function is acknowledged by all to be a legitimate phase of vocational guidance, and to be a necessity for all effective education.

The other phase of vocational guidance which is generally recognized is its individual aspect. Its aim is frequently stated in the words of the old saw, "to keep round pegs out of square holes." It tacitly assumes that every individual is either round or square; that he is fitted

for one kind of work in preference to anything else. It assumes a native capacity present in unchangeable degree. In order to discover this native capacity it is generally held that the individual must submit to a series of tests, psychological and physiological, and on the basis of the results, together with such sociological and economic data as may be relevant, it will be possible to give positive advice as to the right vocation to enter. This fairly represents the prevailing notion about vocational guidance. The idea has been widely exploited and has been made the basis of some rather extravagant promises. Already there is noticeable a tendency toward commercialization of the public interest in the matter, and vocational "prescriptions," compounded in most unscientific fashion, are being furnished for considerations varying from two to twenty-five dollars. Sad to say the public listens eagerly to the promises of this pseudo-scientific vocational guidance, and naturally demands of scientists and educators that they fulfill these promises.

OBJECTIONS TO CURRENT CONCEPTION

A careful examination of the prevailing notion about vocational guidance shows that it is open to serious objections which must be pointed out and overcome if real progress is to be made. In the first place, much misunderstanding about the use of psychological tests will have to be corrected. Popular fancy regards a single one-hour test as probably sufficient to indicate vocational aptitude. Any plan, however, that involves single measurements of mental capacity is bound to meet with difficulties. Power of achievement varies from day to day according to changes in weather, physiological and emotional conditions. This fact vitiates the reliability of single measurements, and any system of psychological tests that claims validity must make allowance for it. It does not constitute an insurmountable obstacle, however, as with sufficient research, it will probably be possible to devise a method whereby this can be allowed for. Nevertheless it should be kept in mind as a possible source of error.

But even with the errors due to chance samplings eliminated, there is a further difficulty in depending upon single measurements; namely, failure to measure susceptibility to improvement. It cannot be ascertained from results of a single test, to what extent an individual is capable of profiting by practice. Not only is the individual susceptible to improvement beyond the limits of his first attainment in any task,

but also the degrees of improvability vary among individuals as much as do the measures of initial performance. If experimental psychology has demonstrated any one thing clearly, it is that individuals vary enormously in capacity for training, and the arrangment of a series of first measures does not bear a constant ratio to measures in successive trials. This is evidenced in widely different kinds of mental activity, from simple acts such as the discrimination between two tones, to complex acts such as typewriting. It is evident, then, that any system of testing that is to be reliable, must be far more elaborate than is popularly supposed. It must provide for measurement of capacity for improvement as well as ability in initial performance.

No matter how highly refined a system of testing might be evolved, it is obvious that an individual could be tested for ability in only a few lines. There might be many occupations wherein he could reach a high degree of proficiency if he were brought in touch with them. How futile it is then, to postulate a fixity and determinateness of fitness for this or that occupation

Again, such postulate is open to the criticism that assails any doctrine involving a search for "types." The uselessness of the "type" as a scientific concept has been repeatedly demonstrated by experiment, and as a vocational concept it falls down completely before the simple circumstance that many persons can be trained to do well a number of things.

In any group of individuals whose abilities are arranged according to the normal curve of distribution there are a few persons at the upper extreme who fall readily into the group of geniuses; and the line of their probable success is quite plainly marked. There are a correspondingly small number of persons at the lower extreme whose deficiencies are so apparent that their vocational possibilities fall within a rather limited range. Between these extremes, however, are a large number (approximately 50 per cent) who could be trained to do a large number of things equally well. Besides possessing the capacity for achievement in various lines of endeavor, these individuals also possess varying interests and tastes.

INTEREST NOT A RELIABLE GUIDE

Some vocational guidance proceeds on the assumption that interest should be the guiding factor in determining a career. Such a criterion is very unreliable, as it happens that many individuals of this inter-

mediate group have several interests. These interests are often conflicting and of equal strength. If they were not, the individual would be able to make a choice without the aid of a vocational counselor. These persons who have varied interests and who cluster about the central tendency in amount of ability, constitute the most difficult subjects for vocational guidance. In attempting to guide them, the vocational counselor must eschew all pretensions to absolute power to select, and above all, must remain keenly alive to the limitations of tests. As time goes on and education applies itself more and more vigorously to the preparation of the child for the best possible future, the truth of Professor James' observation becomes increasingly apparent: "However closely psychical changes may conform to law, it is safe to say that individual histories and biographies will never be written in advance no matter how 'evolved' psychology may become."[1]

Aside from the technical difficulties involved in the current notion of vocational guidance, there are considerations of philosophical import that demand its revision. It holds the fatalistic implication that in the grand cosmic scheme there is but one task that can be satisfactorily accomplished by a single person. It implies that if one finds his niche, success is assured. It further implies that the failures made by "misfits" are due solely to the fact that they did not find the right avenue for their talents. This theory, while embracing the conception of a beautifully well ordered and harmonious universe, leaves out of account the factor of personal volition. It tacitly assumes that if the methods of science be sufficiently refined, one will be able to foretell with practical certainty what will be the destiny of an individual. Such a program is feasible in astronomy where the course of fixed and soulless stars is concerned, but in the realm of human endeavor it is not likely to be of much value as a working hypothesis.

There is a final consideration that will have weight with all who are not inalienably committed to a mechanistic conception of the universe. The current doctrine fails to make allowance for contingencies beyond the control of the individual. It displays a cocksureness of the future that is at variance with facts. Circumstances arise in the life of everyone which, even with the utmost care, could not have been provided for. Whether one attributes these to "chance" or to "the divinity that shapes our ends," they are a part of the universe and must be reckoned with. The individual is not unalterably fixed in his environment, neither

[1]James: Principles of Psychology, Vol. 11., p. 576.

is society cast in an unchangeable mold. Both are in a state of dynamic interplay, and many changes are bound to occur which human intelligence can not predict.

VOCATIONAL GUIDANCE AS ADVICE ONLY

In view of the serious objections to which the current doctrine of vocational guidance is subject, it seems wise to seek an amendment —some aim that is possible of attainment and that does not depend for serviceableness upon a supervision of facts. At this early stage of development, discretion dictates that the work of vocational guidance be regarded as of purely *monitory* value. That is, it should pretend to do nothing further than to marshal facts and to point out possibilities of attainment in giving advice. Given one or more vocational preferences, a wealth of detailed information about occupations, and a highly refined system of tests, one should only counsel as follows: "If you enter this particular vocation you will be hampered in this or that respect, and you will have this or that factor in your favor. If you have sufficient determination you can probably rise above the handicaps and attain to some degree of success in the calling. Science cannot place a tag on you that will guarantee a safe journey over the road of least resistance to a goal of gratified ambition and unalloyed success."

Such an ideal, while not possessing the dramatic possibilities of the more picturesque "pigeon-hole" point of view, nevertheless seems more becoming as a working hypothesis. In the first place, it recognizes the fact that the individual and society are dynamic, not static. Second, it calls for nothing not within the realm of possibilities. It is quite possible to conceive of a development of technic that will enable one to give pointed advice without postulating any mysterious prescience. Third, one who follows such an ideal will be free from the suspicion of charlatanism which can certainly be urged against those who, in order to tickle the ears of a credulous public, would make promises beyond the power of science to fulfill. Fourth, this more modest ideal is free from the errors of a fatalistic philosophy. It postulates no hypothetical "best way." It simply takes facts as it finds them and draws conclusions *based on facts alone*. One is forced to conclude that the former will never lead to a scientific vocational guidance, while the latter observes the precautions demanded by scientific method.

A further advantage which enhances the attractiveness of this monitory type of vocational guidance is that it relieves one individual from

responsibility for another's success or failure. A man of scientific mind revolts from the task of issuing ultimate fiats regarding the future such as are popularly demanded. Advice he will gladly give. Scientific measurements he will cheerfully make. Interpretation of these measurements is his bounden duty. Further than this he can not go, and society should not ask more.

In the light of the conclusions that follow upon the premises of the current conception of vocational guidance, its untenability is readily apparent. This does not mean, however, that educators and others should lessen their zeal in this direction. Instead, the adoption of this monitory conception should accelerate the progress of true vocational guidance. It is thoroly in accord with the requirements of scientific method and entirely within the realm of possibilities. Positively stated, monitory vocational guidance has for its ideal the granting to every individual of the chance to attain his highest efficiency under the best conditions it is humanly possible to provide. Education can have no worthier aim, and the best efforts of the future can accomplish no more than this.

"THE WORLD IS FULL OF WRECKS OF HUMAN CHARACTER WHO ARE SUCH, LARGELY BECAUSE OF THE SINGLE FAULT OF THEIR NEVER HAVING BEEN TRAINED SCIENTIFICALLY IN A VOCATIONAL WAY."—William A. McKeever.

REPORT ON A PLAN FOR AN ELEMENTARY INDUSTRIAL SCHOOL IN THE CITY OF RICHMOND, VA.

ALVIN E. DODD AND WILLIAM T. BAWDEN

NOTE:—At the conclusion of the work of the Richmond Industrial Survey the local school authorities appealed to the Survey Commission for assistance in organizing certain forms of training, the need of which had been developed by the Survey. The officers of the National Society for the Promotion of Industrial Education appreciated the desirability of having the work of the Survey thus logically rounded out, as well as the advantages of having the beginnings of an educational plan in operation for purposes of study at the time of the convention in December. Accordingly, it was decided to organize a number of type classes, and Mr. Dodd and Mr. Bawden were assigned to this work. During the latter part of September and October evening continuation classes for apprentices and journeymen in a number of trades were organized, and a plan drawn up for an elementary industrial or prevocational school. We are glad to be able to publish the following report as a suggestion of the service rendered by the Richmond Survey, and of the offerings at the convention.—EDITOR.

Objects and Purposes. The necessity for vocational direction and guidance for children who are likely early to face the complexities of our modern industrial and commercial life obviously points to the need of securing for these children the kind of life experience which will give them some basis upon which an intelligent choice of a life career may be made.

In addition to its vocational guidance value, an elementary industrial school should present a course of study that will appeal to boys who have lost interest in the work of the regular graded school, and who have either left school because of such dissatisfaction or who are contemplating early withdrawal.

The results of experiments in prevocational training made in Richmond last year offer a suggestion as to what may be accomplished in this direction. These results duplicate the experience of other cities in which similar work has been undertaken.

If a course of training is to be formulated which will help boys to find themselves, and enable them to make an intelligent choice of their work in the future, it must be a varied one. What is needed is an organized training in practical arts, which will include experiences from many fields of employment, such as woodworking, cement and concrete work, metalwork, printing and bookbinding, and electrical construction.

Such a plan should consist of a series of jobs, projects, or enterprises, which, in their accomplishment will give to the boy an appreciative understanding of fundamental processes in the more important industries.

One-half of the time in school should be given to related work in language, mathematics, industrial geography, industrial history, and, in general, to preparation for active and intelligent understanding of civic and social responsibilities. From the outset, the success of all the bookwork will depend upon the degree in which it is interpreted in terms of industrial and social relationships. If the interests and capacities of the boys are to be properly tested, the experience in the shops must be as real as possible.

Experience of the year. The experience of one year with an experimental class along these lines in Richmond has already established not only the value of this kind of effort in interesting boys who had in part lost their interest in what the regular school had to give them, but also the importance of certain factors in determining the success or failure of such a scheme.

It has been found that there are now in the schools a sufficient number of boys who were in this experimental class, and who are eager for the resumption of the work, to form the nucleus of a second-year group as soon as a school is organized.

Entrance requirements. Boys to be admitted to this school should have completed the work of the 5 B grade. This particular form of instruction is planned for boys who look forward to leaving school at a relatively early age in order to go to work, and who need the help of the school in reaching a decision as to what line of work they may enter with the greatest prospect of success.

In no sense is this school to be considered as a provision for defective, delinquent, or incorrigible boys.

Relation to the high school. The rank of this proposed school corresponds to the last two years of the regular elementary school course, and requires the same amount of time for its completion. Graduates from this course should be admitted to the manual arts courses of the regular high schools, upon the recommendation of the principal of the elementary industrial school and the superintendent of schools.

If at any time in the future the public school system of Richmond should be reorganized so as to provide for intermediate or junior high schools, covering the last two years of the elementary school period

and the first year of the present high school period, the plan proposed herein for the elementary industrial school is adapted to fit in admirably with such reorganization.

Building. After a careful study of the possibilities of the situation and visits to a number of schools, and in view of the desirability of keeping the costs as low as possible during the experimental stage, it is apparent that the old Bellevue School building is the one best suited for the purpose. For a number of reasons this building seems to be better adapted for the purpose than any other available quarters. These reasons are:

1. *Location*: The building is located in a populous district, and in addition, is served by two street-car lines, which make it easily accessible to all sections of the city.

2. *Capacity*: The building is large enough to provide ample accommodations at present, and will admit of considerable expansion for meeting future growth.

3. *Adaptability*: The building readily lends itself to the alteration and repairs necessary to adapt it to the purposes of the proposed school, and at a less expense than any other building that could be considered. A certain amount of these necessary changes and repairs would afford excellent practical problems at which to set the boys to work.

In view of these reasons, it is therefore recommended that the proposed school be organized in this building. The alterations and repairs suggested are treated in a separate report.

Equipment. The equipment for the academic classes should provide seats and desks at which certain kinds of work can be carried on under the same conditions that obtain in other schoolrooms. In addition, there should be tables and chairs to accommodate the special kinds of group work and drawing. The construction of the tables will afford excellent problems for the shop classes. There should also be provided the necessary equipment of blackboards, wall charts, maps, teachers' desks, book-cases, and storage facilities.

The wood-working shop should be provided with the necessary equipment of benches and hand tools for the preliminary instruction in the use of tools and materials, and for handling practical problems of repairs and construction. In addition, there should be installed a carefully selected, but not necessarily expensive, equipment of woodworking machines, including band-saw, circular saw, planer, tool grinder, and mortising machine.

Printing and Bookbinding. The equipment for the printing and bookbinding shop should be complete enough to provide for the handling of such work as would be used in the school system. This equipment, in addition to the necessary type, furniture, cases, stands, etc., should include one or two job presses, stock cutter, wire stitcher, and the necessary bookbinding equipment of sewing-frames, presses, etc.

Metalwork. The equipment for the metalworking shop should provide for the handling of the class in small groups engaged in a variety of processes. The benches can be constructed and installed, and the vises mounted by the boys. The sheet-metal equipment should include a break, punches, soldering outfits, etc. There should be installed not to exceed two or three hand-blown forges, with outfit of blacksmith's tools, and equipment for tempering and hardening metals. Instead of the usual elaborate and costly machine-shop equipment, it is proposed to install simply a few typical machines, to make possible the handling of practical repairs and construction jobs, and to give an insight into the fundamental machine operations. The machines selected might include one or two lathes, a small planer, drill-press, and tool-grinder.

Electrical construction shop. The equipment for the electrical construction shop should be sufficient to provide for the handling of a variety of problems in telephone, telegraph, lighting, and power work. Frames and stands can be constructed by the shop classes. There should be, in addition to the small tools, supplies, fittings, etc., one or two small motors, switch-boards, testing apparatus, and electrical appliances.[1]

Course of study. The outline of the proposed course of study is as follows. The four lines of manual work represented were selected because the results of the Survey showed them to be the bases of the fundamental industries of Richmond.

First year:

a. Woodworking, half year, 3 hours per day.
b. Printing, half year, 3 hours per day.
c. Bookwork, entire year, 3 hours per day.

Second year:

a. Metal work, half year, 3 hours per day.
b. Electrical contsruction, half year, 3 hours per day.
c. Bookwork, entire year, 3 hours per day.

Suggested third year. It is believed that the experience of the next two years will develop a demand for a third year of more advanced

[1] An estimate on the cost of the suggested equipments, prepared by G. H. Reade, was presented as an appendix to the report submitted to Supt. Chandler.

work on the part of those boys who shall have completed the course as outlined, and who wish further training. Such a third-year class could be organized to great advantage, and might take either or both of two forms, as follows:

1. *A day vocational class,* in which the pupil definitely specializes in some one line, chosen by himself, in the light of his experiences during the first two years. Two-thirds of the time of the course should be taken up with intensive work in the shop and drafting room, and the remainder with related bookwork and such other study as will best aid him to prepare for the vocation in which he has chosen to specialize.

2. *A part-time class,* which should be arranged to dovetail in with a working program involving a wage-earning occupation. The details will have to be worked out as the conditions arise, but in certain occupations it would undoubtedly prove feasible to dismiss pupils from their places of employment for one or more half-days per week, in order to permit of school attendance. In such a class the time might be devoted entirely to bookwork, or divided between bookwork and shopwork, or bookwork and drafting, or otherwise adapted to the special needs of the group.

Outlines. The following condensed outlines suggest the way in which it is proposed to treat the work of the first two years:

A. *ACADEMIC WORK*—approximately half-time

1. *English.* Language work based on reading, much of the reading to bear upon the industries. Composition, dealing with the occupational work of the school, business correspondence, business forms; spelling and penmanship.

2. *Arithmetic.* To be of a very practical nature, including fundamental processes, short methods used in business, business and trade arithmetic, with emphasis on immediate application to the industrial work of the school.

3. *Geography.* Chiefly industrial, and closely related to:

4. *History.* Closely related to geography and dealing with the industrial and commercial development of the city, State, and country.

5. *Civic and social duties.* Relation of the individual to the community, State, and country; relation of the worker to his work, to his employer, and to his fellow workmen; duties and responsibilities both civic and social, with special reference to sanitation, personal hygiene, etc.

B. *INDUSTRIAL WORK*—approximately half-time.

1. *Woodworking.* To consist principally of carpentry, including such other forms of work as may be called for by the projects undertaken. Study of tools, machines, and structures, such as garage, poultry house; problems in framing, truss construction, and repair work, with emphasis on the latter.

2. *Metalworking.* To consist of work in hot and cold bar metal and sheet-metal; practical problems in repairs and construction which develop in the equipping of the school, will supply work for some time to come. This will include such work as the making of brace and angle irons, bolts, machine and belt guards, simple tools, pipe cutting and threading, metal parts of electrical and other apparatus.

3. *Printing and Bookbinding.* To consist of the simpler forms—mainly the printing of forms, cards, announcements, etc., required for the school; this work to be supplemented by special work in English, proofreading, design, and color harmony.

4. *Electrical construction.* To consist of elementary work in battery construction, magnetism, induction, small motor and dynamo construction, wiring, electrical measurements, and testing. Experiments with batteries, induction coils, and the wiring of bell, telegraph, telephone, and other circuits will be worked out on specially constructed frames.

5. *Cement and Concrete.* To consist of simple repair and construction problems, to be developed in connection with the work in the wood shop; including such projects as the laying of concrete walks, curbs, coping, together with the building of a number of small models to illustrate principles of building and bridge construction. The needs of the school will offer opportunity for a large variety of practical work for some time to come.

6. *Drawing.* To be elementary in character, but practical and related directly to the projects undertaken by the pupils in the various shop courses.

Program. The arrangement of classes suggested for the first and second year work is such that two teachers can handle the first year work, and two teachers the second year work. Classes should be limited to fifteen to eighteen pupils each.

TEACHERS' SCHEDULES

	Monday	Tuesday	Wednesday	Thursday	Friday
Shop Teacher A					
1st Year—a.m.	Sec. 1	Sec. 2	Sec. 1	Sec. 2	Sec. 1
1st Year—p.m.	Sec. 2	Sec. 1	Sec. 2	Sec. 1	Sec. 2
Book Teacher B					
1st Year—a.m.	Sec. 2	Sec. 1	Sec. 2	Sec. 1	Sec. 2
1st Year—p.m.	Sec. 1	Sec. 2	Sec. 1	Sec. 2	Sec. 1
Shop Teacher C					
2d Year—a.m.	Sec. 1	Sec. 2	Sec. 1	Sec. 2	Sec. 1
2d Year—p.m.	Sec. 2	Sec. 1	Sec. 2	Sec. 1	Sec. 2
Book Teacher D					
2d Year—a.m.	Sec. 2	Sec. 1	Sec. 2	Sec. 1	Sec. 2
2d Year—p.m.	Sec. 1	Sec. 2	Sec. 1	Sec. 2	Sec. 1

Distribution of time. The following diagram suggests the time allotments for the different subjects. While Section 1 of the first year class is receiving instruction in the woodworking shop during the first half-year, Section 2 is in the printing shop. During the second half-year the two Sections are reversed. Similarly the two Sections of the Second year class alternate between the metal shop and the electrical shop. In all cases one-half of each day is spent in the shop and the other half in bookwork, as already noted.

TIME ALLOTMENTS

First Year		1st Half-Year	2d Half-Year
Sec. 1	Shopwork	Woodwork	Printing
Sec. 2	Bookwork	Woodwork	Printing
		Concrete	Bookbinding

Second Year		1st Half-Year				2d Half-Year
Sec. 1	Shopwork	Metalwork				
Sec. 2	Bookwork	Bench work	Sheet metal	Forge shop	Machine shop	Electrical Construction

THE TEACHING STAFF

It has already been pointed out that if the interest and capacity of the boy are to be fairly tested, the experiences given him must be as near like the actual shop as possible, otherwise that experience will lack reality. Therefore, the instructors must be men who possess not only a general acquaintanceship with, and knowledge of, the industries represented in the courses of study, but they should give evidence of ability to make intelligent research into, and study of the progress in methods and processes of work in industry. This would insure the teaching of methods of working which are abreast of the times rather than obsolete methods for which many schools are criticized. Salary increases and promotions in rank for instructors should, to a large extent, be based upon such studies. These studies should be made, at least in part, by actually working in industrial establishments during vacation periods.

In order that the closest relationship be maintained between the bookwork and shopwork, instructors, so far as possible, should teach both branches. In addition to the requisite knowledge and abilities outlined, the success of this work is dependent in large degree upon the teacher's power to hold and interest the pupils, and upon his qualities of adaptability, orginality, initiative, and keen interest in the successful handling of the problem. The uninterested teacher should be eliminated from this service.

TRAINING OF SHOP TEACHERS FOR INDUSTRIAL SCHOOLS

HAROLD E. SPEECE.

IN dealing with the subject of training of teachers for industrial and trade schools there are two general classes that must be recognized, depending upon, or resulting from, the two general sources from which such teachers come. These sources are the trained academic teacher, and the trained mechanic. There is a division of opinion as to which source furnishes the better type of teacher. There are those who believe that the primary requisite of such teacher is the ability to grasp the educational value of a subject; to deal with and give instruction to the learner. These hold that pedagogical training is the basis upon which must be placed enough knowledge of the subject to enable the teacher to meet the problems of the school shop. There are others that believe that, since it is industrial training that is wanted, the essential things are the industrial atmsophere, methods, and standards of efficiency. These hold that any mechanic of a degree of intelligence to become a candiate for a teacher's position can be trained sufficiently in methods of instruction to make him the better type of shop teacher. Of course the ideal shop teacher is the one who is thoroughly trained in both phases. But since a thorough training in either involves several years of time and study we are likely, at the present salary schedule, to have to choose between the two types.

To discuss the ability of the mechanic teacher it is necessary to establish the rank in the industry from which the average candidate comes. Frank W. Thomas, speaking at Philadelphia of the Santa Fe System says, "Shop instructors are recruited from the ranks of journeymen in our employ. Some of these have only a common school education, some of them graduated from the University of Hard Knocks, and a few have high school education, but none of them are college men." This statement of conditions would pretty generally hold for all apprenticeship schools established by railroads and factories. In the public schools the situation is slightly different with probably a little more inducement for the man of higher rank to enter. Yet just as the railroad shops or factories cannot take their foremen to teach the apprentices, so society cannot take trained foremen as teachers in public industrial schools. In other words industry outbids the public schools for such men. Dr. Snedden, probably the one most influential in the demand for the

mechanic teacher, says that the rank of foreman is preferable, but recognizes that he can only demand that of journeyman. In my experience I know of but few foremen who have taken positions as teachers, so I think it is safe to conclude that the journeyman rank is all we have to deal with in this paper.

To those of us who know the present method of commercial production and the lack of apprenticeship in the industries, the requirement of journeyman standing does not insure ability. The journeyman is usually the victim of the factory system or the contractor's policy of keeping him at the one special job which he can do best. He might be highly skilled in laying floors, shingling, lathing, framing, stair building, or some other specialty but not have a general training in carpentry. He might be a specialist in some phase of machine work, but we have heard lately, from Mr. Ford, that it takes only two weeks to train a specialist.

Observation seems to show that the candidate is usually a young handy man of a high degree of intelligence, who has been earning his living at some form of the work he intends to teach, who is dissatisfied with the social position of a worker in his trade, and who desires to make more money per year and have a summer vacation.

STRONG POINTS OF THE MECHANIC TEACHER

A number of points in the equipment of the mechanic may be counted as special strengths.

1. He can do good work himself. This gives him a confidence in demonstration, and gives the boys a confidence in him that is invaluable. I remember a remark of a student about a certain teacher. The boy in speaking of his teachers says, "Mr. A. is the best. When he takes hold of a hammer to strike the iron you know that it is going to do just what he wants it to do." There seems to be to us all, and especially to the boy, a strong appeal in the ability to do things with the hands.

2. He can apply commercial standards. Most of our school shopwork falls below commercial standards for two reasons: First, the workers are only of apprenticeship rank; and second, the teacher does not know commercial construction which they would be able to use. The element of time does not enter into our shopwork. I remember to have had a class work an hour making a box and cover of cardboard, and how surprised we were when we found that a little girl in a box factory close

by would have made a better box for one-tenth of one cent. I may have been giving those pupils some understanding of and sympathy for the work of the little box maker, or perhaps an interest in the box itself, but I was not training for a vocation.

3. He can create a shop atmosphere. An atmosphere is the most intangible, elusive thing in the world, and yet it is the most influential. A school boy changes from a careless, indifferent piddler to an earnest, zealous workman with a change of atmosphere, and yet one could see no concrete thing that he could say, "That is it." Perhaps the air of quiet confidence in the ability to turn out work that is worth while gives the boys the same confidence.

4. He is in sympathy with the labor element of society. One of the large features in the training of the worker of today should be the giving of an outlook on life and social problems that would rescue him from the agitator. This would mean constructive leadership by the teacher in the affairs of citizenship and social conscience. This could best be done by the mechanic because the problems of labor today must be solved by the friends of labor, otherwise it will be no solution. The trained academic teacher is usually not wholly in sympathy with the labor element because he is a product of a selective institution, deals largely with abstractions, and is more interested in teaching the traditional past than the progressive present.

5. He can give the student correct guidance as to desirability, opportunity, and dangers of the trade in question. In other words he is a better authority on that vocation, having followed it, than the trained pedagog who has read about it. This vocational guidance is also one of the large functions of the industrial school teacher of the future. Our statistics show that only a small per cent of our pupils really follow the vocation for which they train in these schools. So we must make them more than ever a trying out place, and save some of the misfits if we can.

WEAK POINTS OF THE MECHANIC TEACHER

There are also a number of points in the training of the mechanic which may be counted as weakness.

1. He does not understand teaching principles. In the learning process there are certain fundamental laws and principles. These laws and their operation are the subject of years of study and training for the teacher, and it would be too much to assume that a worker who had spent no thought upon the subject would not suffer in comparison in

this field. We are all familiar with the mechanic teacher who makes the jigs, sets the machine, gives the finishing polish, and makes a splendid exhibit. On the other hand, these laws are not so occult that the intelligent person desiring to impart knowledge or training to a pupil cannot by good sense, accomplish largely what he intends, without having heard of one of them. Also he is dealing with pupils who will not recognize it if they are the victims of poor pedagogy, while ofttimes they would recognize it quickly if the teacher did not use correct shop methods.

The laws and principles of teaching should be one field of training for the mechanic candidate. The teacher must be able to recognize the stage of progress of the learner and be able to carry him forward in sequence. He must recognize that while the learner consciously controls the stroke of the hammer, he is quite as likely to hit his thumb as the nail; that it is the subconscious control that brings skill in operations; that it is one thing to do a thing well, and quite another to tell just what coordinations are necessary to bring the result. He must recognize that training in trade processes is not necessarily education, but may be made the basis and motive for education. He must recognize the value of initiative and resultant satisfaction on the formation of habits, and a few other things like these, before he is prepared to stand before a class to teach.

2. He does not understand scientific management. The urgent demand for better organization and more scientific management everywhere concedes that the standards of efficiency are not so generally recognized as we are sometimes led to believe. Why are not the skilled trades more highly organized and systematized than the unskilled? When organization and system are introduced into an industrial plant today it is not the trained mechanic who is called in to establish the system. It is usually the specialist along that line in college. This means merely that the college man is of a more highly selected group, with greater capacity for thinking and organization.

3. He cannot grasp new problems or problems outside his own specialty like the teacher. I remember one case where a machinst of many years' experience and a technically trained teacher came upon the problem of a change gear box, where by shifting three levers it was possible to get sixteen change of speed. After a glance at the instructions the teacher could make any desired change instantly, while the mechanic had to go over and over the operation until it became a part of his

experience. This is only one "robin," as I well understand, and does not make it spring, but according to my observation the more highly selected and trained group of teachers will be able to duplicate these results in most new situations.

4. In administrative capacity he is likely to over emphasize his own trade. We saw, not long ago, at a prominent high school what to me seemed decidedly a one-sided equipment and overemphasis of machine work. There, in an equipment costing one hundred twenty-five thousand dollars, one-half of it went to the machine work alone. The pattern shop, foundry, and mechanical drawing rooms were simply auxiliary departments to the machine-shop. All other trades commonly taught in school were ignored.

TRAINING THE TEACHER

The strengths and weaknesses of the academic teacher candidate have been given by inference in contrast to the weaknesses and strengths of the mechanic candidate. All things considered it seems to me that the weaknesses just about balance the strength of each. Why then is the weight of sympathy of the organizer today toward the mechanic candidate? Is it not because of the methods of training the teacher candidate? The mechanic frankly accepts the fact that he must study, spend good time and money, and have practice teaching before he can accept a position, and then he usually goes in as assistant. While the teacher candidate heretofore has been accepting positions without further preparation than the study of classroom methods of a slightly different kind. The trouble has been that we have been giving both classes of candidates exactly the same type of training, while their previous experience demands opposite kinds of training.

The mechanic candidate needs the theory and practice of teaching and classroom management. For detailed recommendations see the report of the committee on training of teachers for industrial and trade schools, published by the National Society for the Promotion of Industrial Education.

The academic candidate needs the actual participation in the production in the line he proposes to teach. Let him count the difference in wages in shop and his school salary as the price he pays for training for a new and better paying position. What he should do is frankly to accept the fact that this is a new field of knowledge to him, and that he must study in this field by actual participation. With the addition of

this experience he will become, because of more rigid selection, the better type of teacher.

My conclusion then is that if the demands of an organizer of a school system were such as to bring two classes of candidates, one class with five years experience as mechanics and one year as teachers, and another class with five years experience as teachers and one year as mechanics, the better type of teacher would be found in the more highly selected group of the second class.

WE MUST DEFINE THE EDUCATED MAN IN TERMS OF LIFE AND NOT OF MERE SCHOLASTIC EXPERIENCE. AND WE MUST DEFINE HIM IN TERMS OF THE WHOLE LIFE. WASHINGTON AND LINCOLN WERE EDUCATED MEN, THOUGH THEY HAD LITTLE EXPERIENCE OF THE SCHOOL. THE EDUCATED MAN IS A ROUNDED CHARACTER, WELL ADJUSTED BY NATURE AND BY TRAINING TO THE WORLD IN WHICH HE IS CALLED TO LIVE. HE HAS LEARNED SELF-MASTERY, CONSIDERATION FOR THE RIGHTS OF OTHERS AND THE FINAL ART THAT SCHOOLS SO OFTEN FAIL TO TEACH, OF KNOWING HOW TO LEARN AND KEEP ON LEARNING. KNOWLEDGE THAT IS APPLIED TO LIFE AND IS INCREASED IN USING, SYMPATHY THAT IS EVER AWAKE AND ACTIVE AS A MOTIVE POWER FOR ACTION, HUMILITY AND CURIOSITY THAT DEEPEN AND BROADEN THE SOUL IN FOLLOWING OUT THE THOUGHTS OF GOD—THESE ARE ELEMENTS OF THE EDUCATION WE DESIRE FOR ALL MEN UPON EARTH.—Issac Ogden Rankin.

ADVANCED PATTERN-MAKING AND MOLDING—HOW AND WHAT TO TEACH—II

FRED D. CRAWSHAW AND WALTER CHISHOLM

SWEPT PATTERNS AND MOLDS

ELEMENTARY molding usually requires the use of a completed wooden or metal pattern made the exact size and shape of the desired casting except for the coreprints placed upon the pattern to form holes in the mold in which to place cores.

FIG. 9

Advanced molding does not always require the use of patterns of this kind. Very often patterns are made by sweeping up some material, such as plaster of Paris or clay, into a general form. Any extension of a pattern may then be made of wood tacked on, or if necessary treated as a loose piece. Following are given a few examples of swept work.

Patterns are sometimes made as frames, the thickness of which is the same as the thickness of the metal in the casting to be produced. Such a pattern frame is shown for a 30″ pipe elbow in Fig. 9. The spaces in such a frame are filled in with green sand or loam and slicked over to the outline determined by the outside or inside edges of the frame,

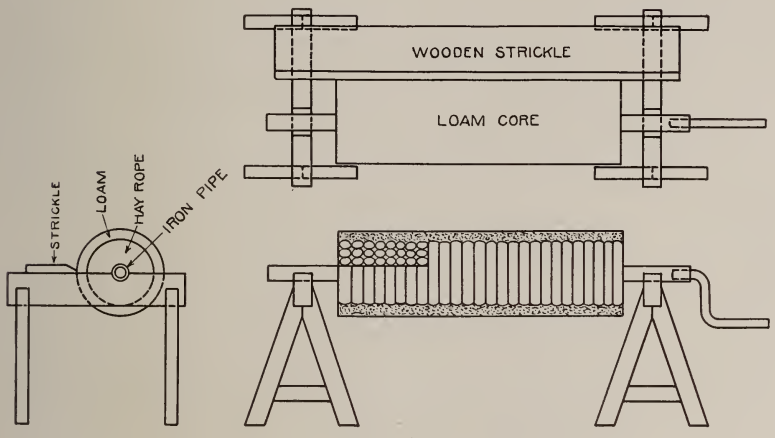


FIG. 10

as the case may be. In the case of the elbow a green sand mold is shown with the skeleton pattern standing beside it. A dry sand core is shown being lowered into the mold.

Swept cores often serve as good cylindrical patterns. The core is swept about a pipe which is placed in a horizontal position and wound with hay rope to within one inch of the required diameter. By placing this in a pair of trestles and revolving it, the core mixture may be applied and turned to any desired cylindrical form and diameter with guides known as strickles. Fig. 10 shows such a device.

After sweeping the core to the desired size and shape, a coating of loam is swept on equal to the thickness of metal in the casting. If flanges or other projections are required, these are made of wood and tacked on, or if desired, they may be treated as loose pieces. On removing the pattern after the mold has been made the wooden parts and the thickness of loam are removed and the remaining portion of the pattern, which is the original core, is replaced in the mold as the core for the casting to be produced.

Floor molds may often be made by means of extending the principle of sweeping cores and patterns just described. The principal difference lies in the fact that whereas in sweeping a horizontal core the strickle remains stationary, in sweeping molds the strickle is revolved about a vertical shaft which rests in a socket made stationary in the molding floor.

FIG. 11

Fig. 11 shows a socket, shaft, collar, arm, and strickle in position ready to sweep the level bed for a fly wheel, the mold for which is shown in Fig. 12.

Figure 12 illustrates the case of a mold which may be built up of cores set in position on a level bed, and the mold completed by means of placing covering cores on top of these to take the place of the cope. One-half of the mold is shown with covering cores removed.

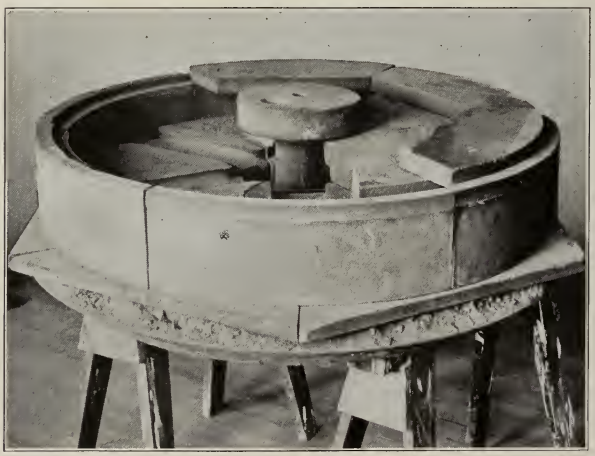


FIG. 12

While it is comparatively easy to sweep horizontal surfaces, as for example the bed of the fly wheel mold, it requires more skill to sweep irregular surfaces, as for example the surface upon which a propeller

wheel blade is built, shown in perspective in the lower half of Fig. 13. Two types of propeller wheels are here shown, one a constant pitch propeller, *A* and *B*, Fig. 13, and the other a variable pitch propeller, *C* and *D*, Fig. 13. As the propellers shown in Fig. 13 are used only for illustration in classroom lectures, the use of plaster of Paris in place of molding sand to sweep the surface was found to be more serviceable.

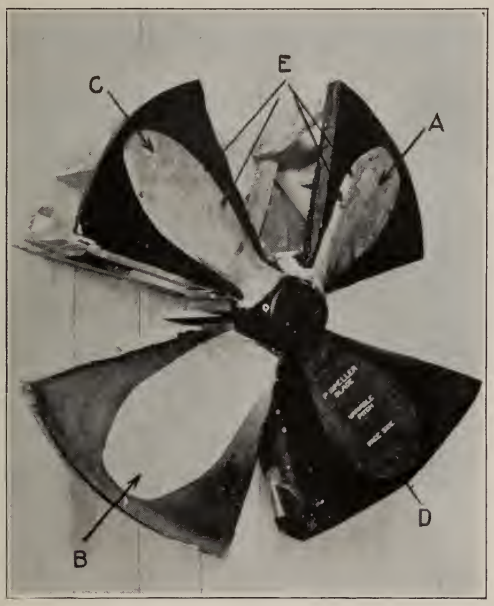


FIG. 13

After sweeping a level bed as shown in the mold for the fly wheel, Fig. 12, the bed is divided into the same number of parts as the mold has divisions, such, for example, as the number of blades in the propeller wheel. The collar on the spindle of the sweep, *A*, Fig. 11, is fixed at the lowest point of travel. The outside end of the strickle is allowed to travel upon a circular rail, the perimeter of which is divided into sections corresponding to the divisions into which the mold was divided, and the top outline of which represents the pitch outline of the pattern, in this case the propeller wheel. As the strickle revolves, it rises and falls as it rides upon the circular rail and blocks out the surface upon which the blades are built. Fig. 14 shows this rail and gives a view of one surface blocked out at right angles to the axis of the propeller.

After the surface is swept up it should be sprinkled with parting sand. The outline of a blade is now marked upon each surface. As the blades increase in thickness toward the hub of the wheel, strips of wood, *E*, Fig. 13, have been tacked on in concentric circles to suit the varying thickness of the blades. The wooden hub is placed in position and sand is filled in between the wooden strips to complete the form of the blades. The upper half of the figure shows the completed blades and hub in position ready to receive the cope. After the cope

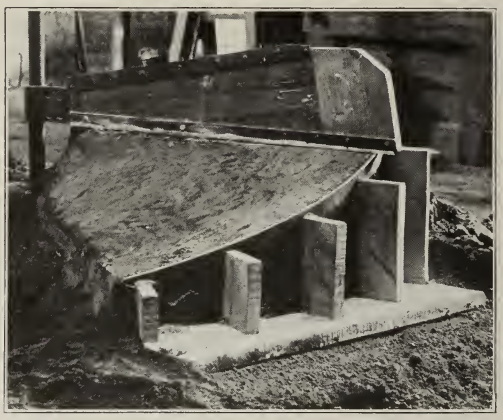


FIG. 14

has been rammed and removed, the blades are stripped off, the hub removed, and the cope is replaced. The mold is then ready for pouring.

PLASTER OF PARIS PATTERNS

The application of plaster of Paris to pattern work has developed considerably in recent years, particularly in Scotland and England. In this country this is true for special patterns, especially those which are carved, such as stove patterns. This material is suitable in the construction of patterns which will be used but once or at most but a few times. However, when suitable follow boards are provided, such as are shown at *A* and *B*, Fig. 15, they will last indefinitely if reasonable care is taken in handling them. It is often particularly desirable from the standpoint of expense to use plaster of Paris in the construction of a master pattern, from which a metal pattern is to made. In preparing the

mixture for general pattern work the proportion suitable for thin patterns or for finishing heavy patterns or core boxes is one and one-half parts plaster to one part water; when thick plaster is required, two parts of plaster and one part of water is a very suitable mixture.[1] The use of lime water is often advisable because it keeps the plaster from setting too quickly, and at the same time reduces the swelling during the setting process, which otherwise might cause the pattern to lose its shape. In some very thin patterns it is better to use all lime

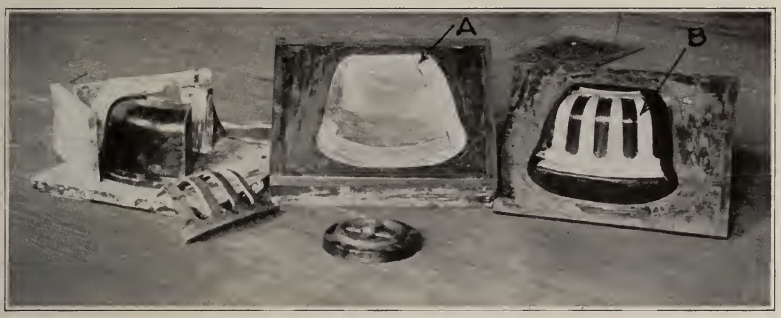


FIG. 15

water, but for general use equal parts of lime water and clear water form a good working proportion.

In preparing the lime water a piece of rock or quicklime may be slacked in a pan by adding a little water from time to time until the lime is reduced to powder or a paste. This may be put into a five or ten gallon can of plain water. The can should be kept filled by adding fresh water. This procedure may be continued until the lime is all used up. One pound of lime will make approximately one thousand pounds of lime water. It would be safer, however, on account of the effect of carbonic acid gas, carried by the water and absorbed on exposure to the air, to count on using about half the amount of water, for then the can might be rinsed out and the contents renewed. Care must be taken when drawing out lime water not to allow any sediment from the can to get into the mixture because this will prevent setting of the plaster of Paris.

[1] Adapted from an article written by Mr. Chisholm for the *Wisconsin Engineer,* November, 1913.

If it appears that the time required to sweep the pattern will be such that the plaster will begin to set before the sweeping operation is completed, smaller quantities of plaster may be mixed by an assistant as required. Working the plaster too much after it begins to set results in soft and crumbly plaster. It is not advisable to add water in an attempt to keep the mixture at a working consistency after thickening occurs. Cement may be added to plaster of Paris in quantities up to fifty per cent of the whole, or even more, to make it harder.

Fig. 16 shows an end bracket for a motor and a step cone pulley, as well as various steps in the production of the cone pulley pattern. At

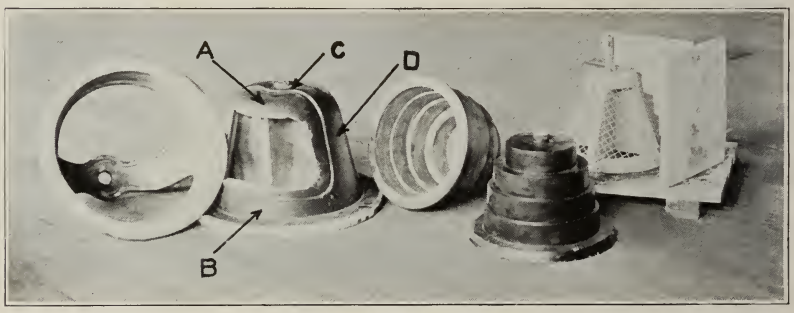


FIG. 16

the right is shown the foundation for a block such as is shown completed just in front of it, and the sweep in position for sweeping up the block. At the center of the cut is shown the finished pattern. These blocks are swept by a sweep moving about a vertical axis. The sweep is made of wood, faced with zinc or other thin metal to act as a cutting edge, and provided with a foot to keep it perpendicular, as shown in the sweep of the figure.

In preparing the foundation a post of the required height is fastened to a suitable board by a screw from the underside of the board. In the top of this post a small metal tube about ½″ long is inserted to form a bearing in which the pin fixed on the sweep works. The molding block is first swept up to the shape of the inside of the pattern. It is not necessary to sweep a solid mass of plaster of Paris for the molding block, as a drum, or form, of whatever shape the pattern may require, can be made from wire netting and fixed to the post so as to clear the sweep by ¼″, as shown. After the board is oiled to allow the sweep

to slide easily, the plaster of Paris is applied to the netting rather thicker than would be used for a pattern, so as to prevent it from running through the mesh of the netting. Some thinner plaster may be swept over the surface of this for finishing.

FIG. 17

At the left is shown a motor end-bracket, together with the molding block upon which it was swept. The molding block is shown open on the sides as it was made, there being no necessity for sweeping up the complete conical surface.

The beads for stiffening the casting as shown on the inner surface of the pattern around the openings are produced as follows: The surface, *A*, Fig. 16, was first swept up together with the raised ring, *B*, and the flat circular surface, *C*. The outline for the recessed surface of the arms is laid out on the block so that an extra thickness, *D*, may

be swept on to form these recesses, and the sweep is altered to sweep up this surface.

To confine this new layer of plaster of Paris to its proper place while being applied in liquid form, strips of leather are tacked on lightly. These strips are thin enough to clear the sweep and the plaster is applied between them and swept. In a few minutes it is sufficiently set

FIG. 18

to allow the leather strips to be pulled off, the edges are trimmed, and the whole block shellaced.

The sweep is now altered to form the outside of the pattern. The block is greased and any marks or lines which may be wanted on the inside of the pattern may be made with an indelible pencil on the block, as they will show up perfectly on the inside of the pattern after it is swept. The plaster may be confined to the outline of the finished arms by leather strips or putty if desired, or if these outlines are laid

out on the block with an indelible pencil the plaster may be quickly pared back to these lines after the pattern is lifted from the block.

Plaster of Paris is applied to the whole surface of the block at first to prevent air holes forming on the inside of the pattern, then the remaining plaster is added until the pattern is swept to the required thickness. The pattern will be ready for removal from the block for trimming and shellacing in half an hour. In the course of sweeping, weak parts of the pattern can be reinforced with wire netting or hoop iron. The process involved in sweeping the block and pattern for the step cone pulley is practically the same as the one just described.

Fig. 15 shows a segment pattern for a motor end shield. On the left is shown the pattern removed and the sweep in position for sweeping the pattern on the block. On the right is shown the pattern fixed to a follow board, *B*. Before fixing the pattern to the follow board a cast is taken off the follow board in plaster of Paris. This cast is then used as a follow board, *A*, for making one part of the mold. The two follow boards are usually set up on molding machines, or, flask pins and guides may be attached for molding by hand. The hand wheel is shown in the front of Fig. 15, placed in a match board. This match board was first swept up for use as a block on which to sweep the pattern.

Fig. 17 shows a wooden pattern and its core box which was swept in plaster of Paris. The box was swept by sweeps working about horizontal axes, the ends of the sweeps working in a bearing cut in each side of the box.

Fig. 18 shows a complete set of plaster of Paris patterns for a centrifugal pump.

(*To be continued*)

MAKING BENCHES AS A CLASS PROBLEM

WILLIAM V. WINSLOW

TO the teacher introducing manual training no more interesting problem is open than that of constructing benches. The school board has given him the necessary hand tools with which to work, recommending that the boys make the benches. He has obtained suitable lumber for these benches, planed on four sides, and cut to length

FIG. 1. SAW-HORSE AND BENCHES CONSTRUCTED BY BOYS OF GRADES SEVEN, EIGHT AND NINE, PREVIOUS TO STARTING WORK ON THE REGULAR EQUIPMENT OF WORK-BENCHES

at the mill. He is given a room in a certain school building which he is to make into a shop. The pupils who are to work under his direction are from grades seven, eight and nine—one hundred and fifty boys. In bringing to completion twenty work benches which are in the shop in our new high school building these were the conditions. A brief description of the method of mastering them follows:

Bearing in mind that all we had to work with at the start were the necessary hand tools, it was naturally our first concern to supply the room with other apparatus with which to undertake the construction of the twenty work benches.

So starting in September the boys made suitable temporary racks for the tools which were to be used in the making of the benches, and in addition constructed ten small saw horses on which to work, Fig. 1. For both of these problems they used boards obtained about the building, principally from boxes in which school supplies had been received. There being no benches of any sort obtaniable, they used an old wooden laboratory table for such tools as could not be used to advantage on the horses. After several lessons, developing a general knowledge of the use of tools, they constructed one carpenter's bench, twelve feet long, from rough planks obtained in the building, together with material from packing boxes. The old table furnished a top for another bench of a similar nature.

In accomplishing this work the teacher arranged that every boy be kept busy for the entire working time that he was to be in the room. This was done by preparing the lesson in every detail and giving a demonstration before the class had been allowed to use the tools. The teacher must know just what each boy is to do at the start.

ORGANIZING THE WORK

It is well when a class has arrived to have the pieces of wood upon which work is to be done placed on the floor or on saw-horses some distance apart so as to be easily surrounded and taken by the boys who are to work on the particular pieces. Some periods may be given over to work on the twenty benches, but others will best include other work indirectly connected with them. An example of this latter type of lesson follows:

The class has arrived and the material is arranged conveniently as explained. The teacher will require the first four boys on the class roll to cut four pieces of boards, from boxes, these pieces to be of a certain length. The teacher explains the purpose of the pieces to be horizontal braces for the ends of the rough carpenter's bench. Later when the boys have finished sawing their pieces to length they will each be directed to work them down to the proper width.

The next six boys will perform another operation relative to this rough bench, the purpose of the bench being to serve in the construction of the individual class benches.

The next ten boys, or the other half of the class will work on the stock which is to go into the twenty new benches, the teacher demon-

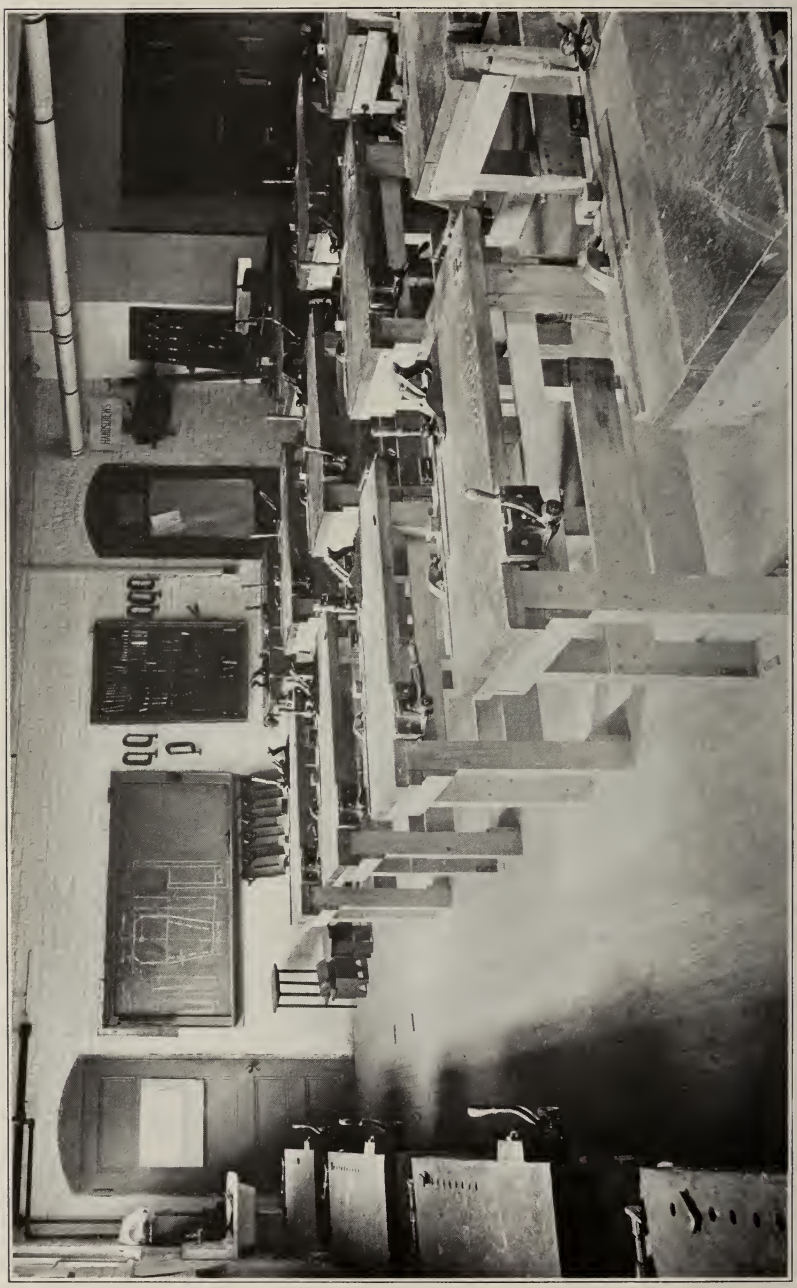


FIG. 2. THE WORK-SHOP AT ADAMS, MASS., SHOWING BENCHES MADE BY THE BOYS

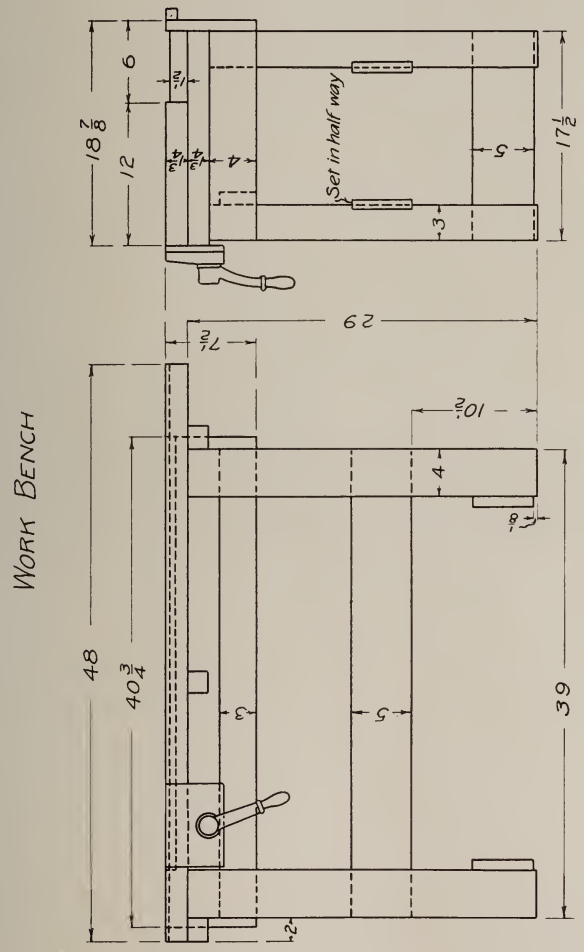

WORK BENCH
18 7/8
6
12
1 1/2
1 3/4
1 3/4
4
Set in half way
5
17 1/2
3
29
7 1/2
10 1/2
4
1/8
48
40 3/4
3
5
39
2

FIG. 3

strating how the places for the screws are located at the ends of the horizontal stretches which are to be joined into the leg pieces. These boys will locate points and bore holes.

When each boy has thus been directed what to do, the entire class will go to work. The teacher then may go about the room to see that things are progressing satisfactorily. Later some of the boys may be allowed to change places with other doing different operations.

It is necessary always to have other things on which the boys may work in case they finish what is assigned. In many schools there is repair work, such as broken desks, tables, and chairs, which are excellent material upon which boys out of work may spend their time to advantage. However, should there be nothing of this sort, the teacher will have other work in mind. There should always be a great many things for the boys to do, for then there is likely to be no cause for idleness, which in itself is bad enough, but when allowed to exist, fosters misconduct.

The following is an example of lesson given entirely to direct work on the twenty benches:

In making notches in the legs, each boy is given a piece of wood which has been planed and cut to length at the mill, the notch having been laid out in a former lesson. Each boy is directed to cut the notches in the miter-box and, later, to chisel out the wood according to instructions. In case the class has insufficient time to complete this process the next class will take it up where the former left it.

By employing these methods, and with twenty boys in the room at a time, our benches have been brought to completion, Fig. 2. They are solid all thru, being made of spruce, with the exception of the tops which are made of maple. Each is supplied with a rapid-acting side vise, and a tail-vise. A wooden vise, however, would answer very well in schools with smaller funds from which to draw, as this would considerably lessen the cost per bench complete. Glue should be used on all the joints. For details see Fig. 3.

In making these benches the boys have obtained a working knowledge of their construction, and have learned the necessity of accuracy. They have made something eminently useful, and they are proud of their achievement. Whatever is to follow in their manual training course they will realize that the very benches which they are using are largely the product of their own hands, and even for succeeding classes their work will remain an inspiration.

PROBLEMS IN MANUAL TRAINING AT THE AGRICULTURAL HIGH SCHOOL, SPARKS, MARYLAND.

WALTER H. MAYS

EACH year some farm problem is given to one of the classes to work out individually. All the boys are given the same problem, but each must develop his along lines different from his class mates.

FIG. 1. MODEL FARM GATE

One of the problems which worked out very successfully and proved of great educational value, aside from its value as a problem in technic and manipulation, was the construction of a set of model farm gates.

There were seven boys in the class and all were given the same problem, each boy being required to select and design a different type of gate, see Fig. 1.

The class discussion dealt at length with such topics as: braces, their importance; the sagging of gate due to weight of free end; how to overcome distortion by proper disposition of braces; materials, weight, strength, advantages and disadvantages of each; construction, careful and accurate workmanship.

The point was brought out that no matter how well the gate is braced or how good the material, if poorly constructed, the gate may still be useless.

After class discussion the models were then constructed to a scale of about 1″=1′ for the general dimensions, using $\frac{3}{16}$″ material for runners, finishing complete with hinges, fasteners, and the hanging of gate on a post 1¼″ square.

FIG. 2. DAIRY BARN

Another problem worked out by one of the senior classes was the design and construction of two types of barn, a dairy barn and a general purpose barn, see Figs. 2 and 3.

The barns were then constructed to a scale of 1″=1′, with the exception of a few of the timbers which, when reduced to scale, were so small that it was impossible to use them.

FIG. 3. GENERAL PURPOSE BARN

The design and construction of these barns was a larger and more advanced project than the farm gate, as they involved a larger field for investigation and study.

In the design of the barn each boy was required to consult available bulletins, encyclopedia, and other reference books to obtain information on the following different problems of the design: Types of barns, shapes, forms, and con-

structions; floor plans, for economy in space, convenience, and sanitary conditions; the amount of air space needed for each animal to be housed; parts of, and name of each timber required in the construction; selection of material to be used both for endurance and strength; joints and braces, where and why each different kind of joint and brace is used; drainage. stanchions, and mangers; roof and roofing material; the concrete construction, with amount of materials; and ventilation, system of and importance.

Afterwards a close estimate of the cost of construction was made, taking into account the cost of materials and labor. Of course, it was possible only to approximate the amount of labor, as the exact time could not be determined.

The barns were complete in construction in every detail, with the concrete foundation, stable floors, gutters, and mangers; stanchions, stalls (single and box), framing, doors and door frames, windows (frames and sash), weather boarding, roofing, and system of ventilation. The interior construction is suggested in Fig. 4.

FIG. 4. INTERIOR CONSTRUCTION

EDITORIAL

THIS magazine cannot let pass unnoticed the appointment of its managing editor, Dr. William T. Bawden, to the new office of specialist in Industrial Education in the Bureau of Education, Washington, D. C. This position is one of importance, even now, and it is likely to grow very rapidly in the service it can render. Its great importance becomes apparent when one considers the present tendency in legislation with reference to education, the increasing demand for help in solving the problems of vocational education, and the probability that the Bureau of Education will soon become the national center in the administration of a large fund for vocational education, as outlined in the Hughes bill.

Concerning the personal and professional qualifications of Dr. Bawden, we might speak in detail and with authority if that were desirable. We know, however, that it would be more in accord with his wishes if we were to omit personal reference of this nature in this column, but we cannot refrain from joining with his numerous friends in congratulating the Commissioner of Education on this admirable appointment. We are sure that all who know Dr. Bawden will agree with us that there was no other man in the country, with adequate training for the office, who is so widely and favorably known and held in such high regard by the leaders in vocational education in all parts of the country. In his knowledge of men and conditions, as well as in his sympathies, he unites East and West, North and South to a degree that is very exceptional. He will have the hearty cooperation of the men now in the field, and with that, he is sure to render a great service to the nation.

—C. A. Bennett.

New Analysis of Industries Needed

In this column for December we stated the fact that this magazine favors the development of schemes of industrial education which proceed from accurate and detailed knowledge of the conditions in the industries and occupations concerned, and that to this end it favors the further analysis of the processes and organization of specific industries with a teaching purpose in view. We regard this as very important if industrial education is to go forward on a sound basis. Too many enthusiasts in vocational training have seen only its superficial aspect. They have argued

something like this: "We want the schools to train up men who are efficient. Efficiency comes only thru experience; therefore we must give the experience during the school period. Experience in shopwork that counts toward efficiency comes only thru working in a real shop—a commercial factory shop; therefore a commercial factory must be a part of or in cooperation with a modern school system."

To some observers this would seem to be the whole story, but it is not. Putting a boy to work in a commercial factory shop gives him experience, but it does not insure his getting the best kind of experience, nor does it insure his getting experience in the most economical way. Moreover it does not insure his acquiring that richer knowledge of materials and processes and tools which, from the teaching standpoint, ought to come along with that experience. A factory is organized to produce goods and make money, not to give experience and knowledge to the workers. To adopt the enthusiast's reasoning, as above stated, and to stop there is essentially to repeat the experience of the Manual Labor Movement of 1830, tho with a different motive and in a shop of different size and organization. In other words it is to go back historically to the time when industrial processes had not been subjected to pedagogical analysis, when too much emphasis was placed on the mere doing of things, and not enough on doing the best things, and doing them intelligently.

Anyone who has had experience in a highly organized modern factory must admit that learning a trade in such a factory involves numberless repetitions and strivings for speed on the part of the learner, and hasty explanations, failures to point out principles involved and other short-comings on the part of the foremen, that do not add to the value of the work from a teaching standpoint, but, in fact, delay educational progress. This is not saying that repetition and speed are without educational value, for they do have value, nor is it saying that stupidity should be tolerated, but it is saying that a highly organized factory shop that has merely a commercial end in view is not *per se* the best educational shop for a beginner, be he young apprentice, part-time pupil, or engineering college freshman. Even the factories themselves have often recognized this, and when they consider economy and effectiveness in the training of their own workers thru apprenticeship, they have established special shops for the apprentices where they may be put thru a course that eliminates many, if not all, of the uneducative elements, and under a foreman whose chief business is to teach rather

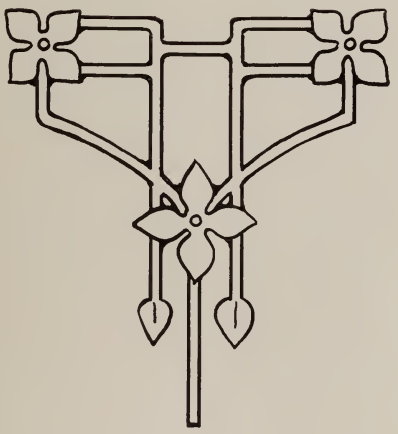
than to produce, or in other words to produce producers instead of material products. If it is economy for the manufacturer to eliminate the uneducative elements and conditions of his own factory in the training of efficient workers, surely the schoolmen should profit by his example.

What is needed is a new analysis of the individual industries (not industry in general) with a view to determining what are the essentials and what the unessentials—what elements are educative and what are uneducative as they appear in the factory. By this we do not mean educative in the general sense merely, but educative with reference to that particular industry. This is needed for the proper directing of students in shopwork, whether that shopwork be done in a school shop or a commercial factory. It is needed, too, for another purpose: It is quite certain that in related industries many common elements will be found, and it is these common factors that should be given the emphasis in the elementary industrial schools that are now being organized, because these schools do not give the preliminary training for one industry, but for many.

Before the great problems of industrial education can be solved, each industry needs to be subjected to a process of analysis, and selection with reference to teaching. This involves difficulties because it cannot be done by the school superintendent in his office or by the psychologist in his laboratory. Such men may assist—may even determine many important factors, but the man who does it most successfully must be both a trained teacher and a skilled worker. It involves other difficulties also because it cannot be done once and so done for all time. Just as often as industrial processes change, this analysis and selection will have to change. There are some fundamental elements that will remain the same, and, fortunately, these are just the ones that should be given emphasis in the elementary industrial schools. But in the details of application which come in advanced instruction, changes are taking place all the time. The hope then for the future is in raising up a new generation of industrial teachers who will be clear thinkers, skilled workers, good instructors, who know the reason why as well as the obvious facts, who have the power of analysis and selection with reference to education as highly developed as this power has been developed by the successful manufacturer with reference to money-making. The hope of the present is in keeping the high ideal, and in not becoming satisfied with either antiquated and stereotyped courses, on the one hand, or un-

organized or merely commercially organized labor on the other. One of the greatest needs of the hour, then is an analysis, or in some cases a re-analysis, of the processes and organization of specific trades and industries with reference to teaching. Dr. L. D. Harvey, of Stout Institute, has been quoted as saying that $40,000 should be expended at once to undertake just such a work. The facts that such an analysis would give are certainly needed to a degree represented by that sum of money. If the money is not forthcoming perhaps an equally valuable result, tho longer in coming, may be brought about thru the cooperation and organization of teachers and special supevisors now in the field.

—C. A. Bennett.



OF CURRENT INTEREST

SELF-SUPPORTING INSTRUCTION

THE leading speaker at the manual training Round Table held in connection with the State Teachers' Association of Kansas, November 13 and 14, was Emery Filbey of the School of Education, University of Chicago. In discussing the "Reorganization of Manual Arts Courses in Their Relation to Industrial Education," Mr. Filbey referred to the "economic plan" for giving industrial training, recommended by the staff of the recent survey of Springfield, Illinois, and added a warning that is timely if we are not to repeat some of the mistakes of the Manual Labor Movement of 1830. The plan referred to is essentially that in operation at Gary, Ind. Mr. Filbey said:

> There is a demand for this kind of work, more or less insistent, from almost all parts of the country. Some courses are being based upon this plan entirely, others are partially made up of this kind of work, and still others have nothing of the kind. What shall we say about it? I only wish to say this: If the course can be made a better course for the pupils by making it self supporting on the above basis, well and good. If it can be made a better course by organizing it upon another basis, our duty is plain. Take the case of the industrial student who can remain in school for about two years. Are we justified in giving this student one course rather than another because it costs less money? Here is a boy who wants to study medicine. We send him through the elementary school at public expense. We give him four years of high school training and nobody asks that it be made self supporting. We send him to the state university for four years and nobody asks that *it* be made self supporting. He goes on to the medical school for another term of years and nobody asks that *it* be made self supporting. This young man is graduated and located in an office down town. We go to him for a diagnosis and he sends us a bill for twenty-five dollars. Still, some people demand that the little fellow who asks only that he may be given two years of preparation for his life work, that he may be helped out of a "blind alley job" and escape being a menace to society; they ask, I say, that this little fellow be made to pay his way as he goes. I submit the proposition to you: In all fairness does not this less fortunate of the two boys deserve two years of public education at public expense? Let me be sure that I am not misunderstood. If work such as this in question can be done to advantage, it is a fine thing and we need it; but if it cannot be done to advantage it should not be made a burden.

While viisting one of the best trade schools in this country a few months ago the superintendent of that institution made this remark: "If we need a desk in the office we send an order to the woodworking shop. That order hangs there until that piece of work can be made to advantage. If it is not done in a year and we have to have it, the piece is bought in the market." That is a private school; boys live there throughout the school year, are furnished free tuition, board, and quarters. If any institution in this country is justified in asking boys to work for the institution, that one certainly is. Their course is one that gets results and a careful study of their system leads one to conclude that the last word has not yet been said about the problem of making manual arts courses self supporting. There may be some excuse for the complaint that manual arts courses are sometimes merely an excuse for the exploitation of manual labor.

Most of the advocates of courses which call for a "baptism of real work" forget that even a superficial baptism of this kind, to be worth while educationally, must involve a certain amount of technical skill, the acquisition of which involves habit formation. They forget that many of our most progressive industries have found this habit formation period an expensive one if passed through while engaged wholly upon productive work in the shops. What have they done? Provided corporation schools, at corporation expense for the purpose of eliminating waste and expense. Can the public schools afford to take up a proposition found to be a failure by progressive industry?

CABINET MAKING NOT ENOUGH

At the Manual Training section of the Minnesota Education Asosociation which met in October, at St. Paul, A. V. Storm, professor of agriculture, University of Minnesota, emphasized the idea that the manual training which is merely the "cabinet type" is not touching the vital part of the community; that "to make it vital the industries of each community should be analyzed, and the essentials picked out and incorporated in the manual training course." He urged that "in agricultural communities, the manual training teacher should teach farm mechanics, the erection of farm buildings, road building, farm drainage, and not leave this to the agricultural teacher as is usually the case."

The other speakers on the program were: Leonard Williams, St. Cloud; Jessie B. Davis, secretary, National Vocational Guidance Association, Grand Rapids, Mich., and Jay F. Knowlton, Hibbing. There was a heated discussion centering around the point made by Mr. Williams, that the manual training teachers should not allow boys to continue to take manual training if they show no ability, for it is the duty of the manual training teacher to correct as many misfits in the mechani-

cal world as possible." Mr. Davis agreed with Mr. Williams. Another interesting feature of the meeting was Mr. Knowlton's exhibit of forge work done by boys in the seventh grade. It was a convincing proof of his belief that the seventh grade is the place to begin forge work.

TO STIMULATE ART IN THE INDUSTRIES

The Art Alliance of America, organized last spring, has recently opened its head quarters in New York City. The Alliance is to be a clearing house for art products thru the bringing together, for their mutual benefit, of artists and manufacturers. The aim is to improve the art side of our manufactured goods.

To the accomplishment of this aim, the Alliance has established an employment bureau and has compiled a directory of artsists, artisans, and employers of artists. It hopes thereby to send the right designer to the right manufacturer.

The Alliance is also trying to raise the standard of commercial design by influencing the artist to cooperate in the design of machine made articles. This is essential, so think the leaders of the Alliance, if we are to successfully compete with European manufacturers and if our artsists are successfully to compete with the foreign trained artsists who are now in the best places in many of our own establishments. In England, the London County Council Schools train not only the producers but the shopkeepers and salesmen, so they can choose between articles of good and bad design. In Germany, the manufacturer has put art into the design of such common things as letter paper, wrappings, cards, advertisements, and labels. Some of these, even after they have been thrown away, are gentle reminders of beauty as they flutter in dusty corners of ordinary humdrum German life. Briefly, the Alliance aims to develop American talent for American requirements.

Another means of reaching the end in view, is the giving of exhibitions of industrial art, as in Germany and France. Space will be given to such things as wall paper designed by artsists, and to suits of rooms furnished with all the accessories designed by artsists and carried out by manufacturers. Designs will be shown in a way to bring out their possibilities. Thus designs for panels of subway cars will be arranged to show how unity of effect may be gained without sacrificing the direct appeal of each advertisement.

At first the Alliance aims merely to gauge conditions in its chosen field, it is not bent on reforms before it has well investigated these conditions. Besides its work with artist and the manufacturer, it will try also to stimulate the public to an appreciation of the economic and aesthetic value of art in the industries.

CONFERENCES ORGANIZED IN NEW YORK STATE

A series of vocational conferences is being held under the auspices of the New York state education department. These are distributed

among the cities in different parts of the state. In order to make these conferences most effective the state has been divided into five conference districts as shown by the accompanying map. Two meetings a year will be held in each district but only one in any given city.

The purpose of the conferences, to quote the announcement, "is to develop a spirit of cooperation among the vocational teachers of the

state and bring to their attention that which is best in educational thot pertaining to vocational teaching."

The officers in charge of the conferences are planning the programs to meet the needs of the teachers in the districts where the meetings are to be held. Each teacher is urged to write to the officer in charge of the meeting, giving a list of the topics in which he or she is interested. The vocational schools in the cities where the meetings are to be held will be open for inspection the first day of the meeting. It is suggested that as many as possible take advantage of this opportunity. Exhibits of the work of the vocational schools of the locality, inclusive of the work of the shop, drawing room, laboratory, and classroom will be arranged if possible. The suggestion is made that such an exhibit would serve as a valuable basis for discussion at one of the sectional meetings.

COOPERATION IN PHILADELPHIA

During the past twelve months Philadelphia has seen a new movement toward educational progress. First, the occupations and educational needs of the 20,000 working children in the city were carefully investigated. Then a study was made of the opportunities already in the city for training them, resulting in a conference of public and private schools under the auspices of the Public Education Association, which considered among other things extensional education.

Widespread enthusiasm was aroused, and as a result a bureau was established by the Association to carry out this work in Pennsylvania. State-wide propaganda were begun, a survey of the educational and social assets of the various sections of the city was made, and the great mill district of Kensington was chosen as a center for immediate development.

Classes in salesmanship for employes in the stores were successfully conducted during the summer. A large program, including day continuation classes in salesmanship and business efficiency, an evening course in textiles, the establishment of thrift clubs among the workers, health clubs, and other features, will be carried out during the winter. The business men and manufacturers of the community are vitally interested, and the Kensington Board of Trade has given definite cooperation in this movement.

A practical combination of employers and technical schools was organized last winter into a section of the Public Education Association,

known as the Industrial Technical Education Conference. The objects of this organization are to unite educators and business men in an effort to bring about a closer relationship between the schools and industry, and to improve the opportunities for evening instruction for young people who must leave school early to go to work.

Under the auspices of the Conference a series of meetings was held, at which representatives of typical industries—engineering, the building trades, the metal trades—met with schoolmen and told them what the schools could do to help them in training men for their respective lines of work.

Another feature of the program is the distribution of joint announcements for all the schools, telling ambitious young men and women where they may obtain training in any chosen field. The office of the Association serves as a clearing house for information in regard to industrial and technical courses, and an investigation of all opportunities for vocational training in the city—professional, industrial and commercial—is now under way.

THE LUX SCHOOL IN SAN FRANCISCO

The Lux School of Industrial Training for Girls, San Francisco, owes its existence to the bequest of one million dollars from Mrs. Miranda W. Lux, who was associated for years with Mrs. Sarah B. Cooper as a leader in the kindergarten movement. It is thru the generosity of her gift that the school could be so well housed and equipped in the beautiful building recently built for it. This school is the third in a group of closely allied high schools, all of which are under one director, George A. Merrill. The Lux School is under the direct supervision of Miss Thereasa M. Otto, dean of the school. The other two schools are the Wildering School of Industrial Arts, which teaches the building trades, and the Lick California School of Mechanical Arts, which teaches the machinery trades and also prepares for the university. The Wilmering school is for boys, while the Lick is coeducational, as the girls in the Lux School who are preparing to enter the university, take some of their courses there. The schools are still further united thru the social activities of the students. These activities are left largely to student initiative, altho under careful supervision of the teachers.

Since an increasing number of women are becoming wage earners, they must be prepared for it, but since this period of wage earning is

THE LUX SCHOOL OF INDUSTRIAL TRAINING FOR GIRLS

comparatively short, for the majority sooner or later enter home life, they must also be trained for efficiency in the home. The curriculum of the Lux School is based upon and grows out of these needs. It is so arranged that the girl who can remain in school for only two years may leave at the end of that time, having completed a unit of work. The full course is for four years. The subject matter is made into a net work of correlation between all the departments. The details of the work are discussed and planned in advance for each quarter by the teachers in conference. Thru this system of interlocking, the work is so arranged that the students are trained to see nothing in isolation.

As the visitor steps into the Lux School, he will catch himself exclaiming, "These are not school rooms, these are real rooms!" They are not only unusual school rooms, for in them is home furniture, but unusual rooms, made so by their good proportion and beautiful color

treatment. Instead of a model flat, which is too often cold and cheerless and is never lived in, every room is in daily use and is so arranged and

ON THE ROOF AT THE LUX SCHOOL

equipped as to give the atmosphere of, and constant association with, a well ordered home. The living room, for instance, is used as a recitation room for instruction in decorating and furnishing and everything pertaining to beautifying the home, the girls sitting around the living room table, or circled around the fire place, just as if they were in a living room at home. Here, also, the girls practice parliamentary usage, debating, and the presenting of oral and written reports on special topics connected with their regular class work, or on investigations of industries and activities of the community. By means of these reports the girls come into close touch with the work of all departments of the school, gaining thereby a fund of information intimately connected with their interests, besides acquiring poise and self possession before an audience and valuable training in English expression. In the dining room the girls entertain at lunches of their own making, not fellow students in mock formality, but friends and even strangers, whom they must treat with genuine courtesy and thoughtfulness.

That the girls may study labor and time saving devices for the making of efficient housework, the school is well equipped with the best

LAUNDRY WORK IN THE LUX SCHOOL

BEDROOM WORK IN THE LUX SCHOOL

A LUNCH PARTY AT THE LUX SCHOOL

of these. The cooking room equipments are entirely of steel and vitrolite. In the cafeteria, everything is operated by electricity, including the ice-making machine. The electrical specifications were prepared by the General Electrical Company and it was instructed to provide everything electrical that is likely to be in a home or in a school twenty-five years from now, for in California almost everything will be done by electricity within this time.

It is thru the generosity of Mrs. Lux that this almost ideal opportunity can be given, free of charge, to the girls who come to the school for life training.

NEW BUILDING TRADES SCHOOL, THE STOUT INSTITUTE

NEW BUILDING TRADES SCHOOL—THE STOUT INSTITUTE

Facts concerning the new Trade School Building of Stout Institute, Menomonie, Wisconsin are as follows:

Size of building, 84 feet by 175 feet, two stories high at north end, three stories high at south end.

Bricklaying Shop at right end of building, 36 feet by 80 feet, ceiling 20 feet high.

Plumbing Shop next to bricklaying shop, 32 feet by 80 feet, ceiling 20 feet high.

Joinery Shop next to plumbing shop, 30 feet by 68 feet, with assembling room in the rear, ceiling 12 feet high.

Mill next to joinery shop, 32 feet by 80 feet, with ceiling 12 feet high and basement below for electric motors, belted up through the floor to the machines.

Carpentry Shop next to mill, at south end of building, 36 feet by 80 feet, ceiling 20 feet high, lumber balcony and dry kiln at rear, lecture balcony at front, opening in outside wall 27 feet by 20 feet for removing products of shop.

In addition to these shops opening on the grade level, there are several rooms on the second floor: two drafting rooms, an elementary woodwork shop, wood finishing room, varnishing room, and lecture room.

AN INTERESTING PROBLEM

When work began last spring on the school farm connected with the Detroit, Minnesota, high school, the agricultural department was sadly in need of a small barn in which to store tools, equipment, seeds, etc. The question of cost, however, seemed likely to prevent any such building being erected soon enough to fulfil present needs. The manual training department took up the proposition, got out plans, and made an estimate of the cost. It was found that such a barn could be built by the manual training boys at a considerable saving to the community, and that the boys were very anxious to do the work. The Board then decided to have the barn built at once.

Here was an excellent opportunity for some real, practical work, and it was surprising to note the interest and enthusiasm which the boys

showed. In order to build the barn they were obliged to sacrifice their regular shop and drawing periods, and had to walk half a mile to and from their work. It was realized when the work started that there could be no time lost or wasted as there remained just four weeks of school. The barn was completed with one week to spare. How the boys did hate to go back to the shop and drawing room for that final week, after enjoying the out-of-door work. That the community was interested in such work, there can be no doubt, for more than one citizen has said, "That is just the kind of work the boys ought to do."

—F. C. Riess.

HOUSE BUILT BY BOYS, POTLATCH, IDAHO

This house in Potlatch, Idaho, was built entirely by these nine boys, under the direction of their instructor, F. E. Lukens. Five of the boys were from the grades, the other four from the high school. Of course they were a "picked nine." The work was done on contract, each of the boys earning a good wage, and at the same time receiving credit in school for the manual training work. The building of the house was so much of a success that, in the future, more work of this kind will be given to the boys of Potlatch.

SHOP NOTES AND PROBLEMS

ALBERT F. SIEPERT, Editor.

The problems presented in this issue have the principle of correlation as a basis and are an indication of how construction may be linked up with various subjects to the advantage of all concerned.

The first item depends for its success upon close connection with the science department of the school. Many bird houses or nesting boxes have been built without adequate information about the bird life of the community, or the habits of birds which fix certain requirements in the houses they will use.

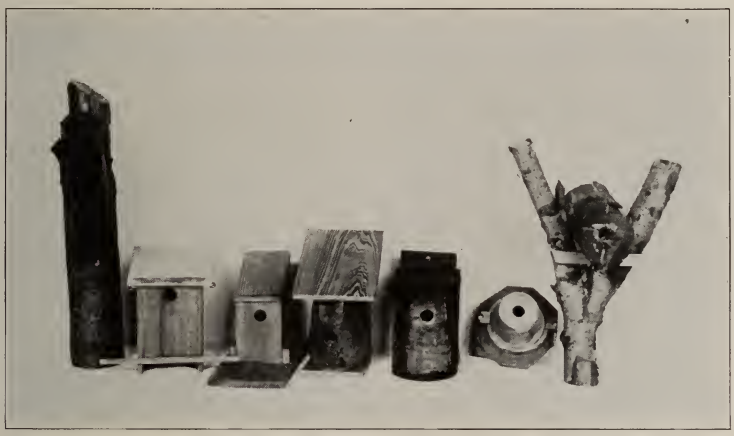


FIG. 1

Since such studies require time, the material is now presented in order to be of service to those expecting to use this problem before birds return in the spring. Certain reference material is needed which can be found in the following list suggested by Dr. W. H. Packard of Bradley Institute.

Dearborn, *Bird Houses and How to Build Them,* Farmers' Bulletin No. 609. Hiesmann Martin, *How to Attract and Protect Wild Birds.* National Audibon Societies. National Association of Audibon Societies. *Putting up Bird-boxes,* Special leaflet, No. 18. E. H. Forbush, *Nesting-boxes,* Bird Lore, Vol. VII, p. 5. E. H. Forbush, *Useful Birds and their Protection,* Mass. Board of Agriculture. *The American Bird House Journal,* Jacobs Bird-house Co., Waynesburg, Pa. Joseph H. Dodson, *Book About Birds.*

The Farmers' Bulletin gives some extremely important suggestions from which the following table is copied:

Dimensions of nesting boxes for various species of birds

Species	Floor of cavity *inches*	Depth of cavity *inches*	Entrance above floor *inches*	Diameter of entrance *inches*	Height above ground *feet*
Bluebird	5x 5	8	6	1½	5 to 10
Robin	6x 8	8	(1)	(1)	6 to 15
Chickadee	4x 4	8 to 10	8	1⅛	6 to 15
Tufted titmouse	4x 4	8 to 10	8	1¼	6 to 15
White-breasted nuthatch	4x 4	8 to 10	8	1¼	12 to 20
House wren	4x 4	6 to 8	1 to 6	⅞	6 to 10
Beckwick wren	4x 4	6 to 8	1 to 6	1	6 to 10
Carolina wren	4x 4	6 to 8	1 to 6	1⅛	6 to 10
Dipper	6x 6	6	1	3	1 to 3
Violet-green swallow	5x 5	6	1 to 6	1½	10 to 15
Tree swallow	5x 5	6	1 to 6	1½	10 to 15
Barn swallow	6x 6	6	(1)	(1)	8 to 12
Martin	6x 6	6	1	2½	15 to 20
Song sparrow	6x 6	6	(2)	(2)	1 to 3
House finch	6x 6	6	4	2	8 to 12
Phoebe	6x 6	6	(1)	(1)	8 to 12
Crested flycatcher	6x 6	8 to 10	8	2	8 to 20
Flicker	7x 7	16 to 18	16	2½	6 to 20
Red-headed woodpecker	6x 6	12 to 15	12	2	12 to 20
Golden-fronted woodpecker	6x 6	12 to 15	12	2	12 to 20
Hairy woodpecker	6x 6	12 to 15	12	1½	12 to 20
Downy woodpecker	4x 4	8 to 10	8	1¼	6 to 20
Screech owl	8x 8	12 to 15	12	3	10 to 30
Sparrow hawk	8x 8	12 to 15	12	3	10 to 30
Saw-whet owl	6x 6	10 to 12	10	2½	12 to 20
Barn owl	10x18	15 to 18	4	6	12 to 18
Wood duck	10x18	10 to 15	3	6	4 to 20

(1) One or more sides open. (2) All sides open.

Following these suggestions the bird houses shown in Figs. 1, 2 and 3 were made by students at Bradley Institute. Fig. 1 shows houses suitable for wren, chickadee, white-breasted nuthatch and the tufted titmouse. At the right in Fig. 2 is shown a house for bluebirds; the second nest is shown in section to give the idea of a woodpecker or flicker nest. These birds do not gather nesting material, hence some shavings must be left in the cavity for that purpose. The nest on the right is intended for martins as they live in colonies, the lower section being removed and placed to the right to show construction. This house provides for six families. Fig. 3 presents a variety of houses, those in the upper row are wren houses to be suspended from a limb. The lower left hand nest is typical of robin and phoebe nesting boxes, the second one is a bluebird

FIG. 2

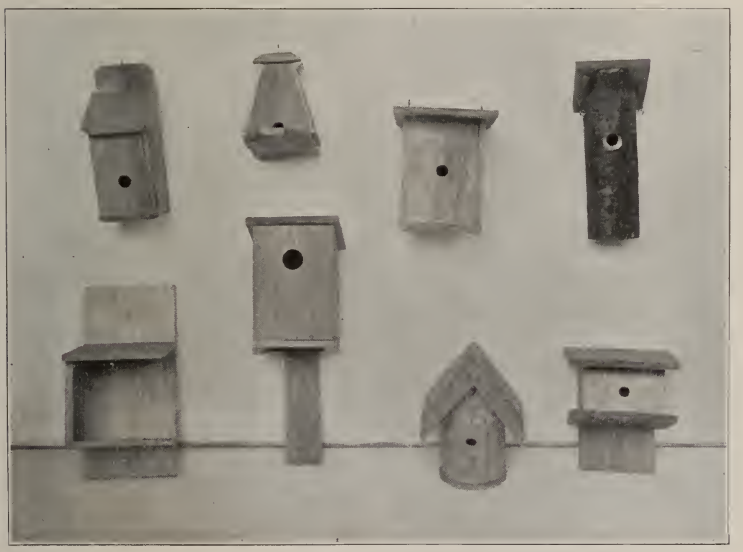


FIG. 3

house to be nailed to a post, the bottom being removable for cleaning purposes. The last two are wren houses. All of these should be painted neutral grays or green when placed in or near trees, others set on poles, etc., may be painted white.

The following material was contributed by the manual arts department of the University of Wisconsin and indicates the methods of approach and results of a similar study.

BIRD HOUSES.

It is estimated that the annual damage done to agricultural crops by insects is about $100,000,000. How to check this gradually increasing loss is a

serious problem, the solution of which calls for the united effort of us all. Now how can we who are interested in manual arts work be of assistance in solving the problem?

We all know that birds are enemies of insects, but we do not always appreciate of what great economic importance our little feathered friends are. It has been estimated by the government that the bob white of North Carolina and Virginia alone consumed 340 tons of insects and 1341 tons of weed seeds in a single year. The bob white is only one of our many valuable species of birds.

Each year, however, as the forests become smaller the birds are more poorly provided for. Many young birds and eggs are destroyed by thoughtless people, and because they lack protection from other natural enemies.

During the past winter our manual arts department made a large number of bird houses which were put up on the campus by the boys in the spring. The houses were made in various designs as can be seen by the accompanying illustrations. The holes were made of different sizes in order to accommodate the different kinds of birds. During the time that the houses were being planned and made we took counsel of Prof. A. C. Burrill, assistant state etymolo-

gist for Wisconsin, who at one time gave us an illustrated talk on birds.

The story of birds proved to be very interesting to us. We feel that the bird houses will not only add to the beauty of the campus in attracting more birds, but also that the birds will be of considerable economic value in destroying harmful insects. The houses served as an excellent woodworking problem.

—Ben W. Nelson, University of Wisconsin High School.

CORRELATION WITH ALGEBRA

The following problems, if given in the draughting room, will materially assist the student of algebra and give him a clear understanding of these simple but sometimes incomprehensible truths.

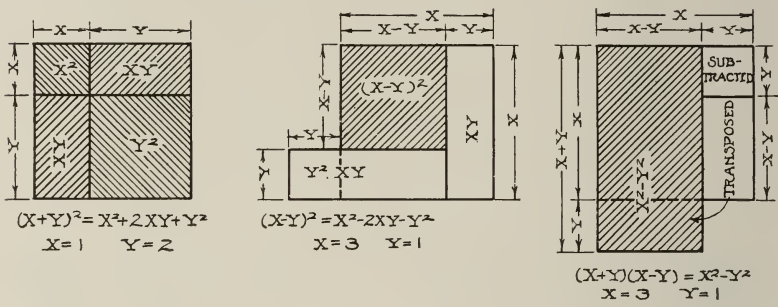


FIG 1 FIG 2 FIG. 3

Fig. 1 illustrates the theorem, "The square of the sum of two quantities is equal to the square of the first, plus twice the product of the first by the second, plus the square of the second."

Example $(x+y)^2=x^2+2xy+y^2$. Have the student assume a definite value for x and one for y. Have him construct a square, the sides of which are x+y. Now on this surface have him lay off x^2, y^2, and the two rectangles xy. Treated in this concrete way the above theorem should be firmly fixed in every student's mind.

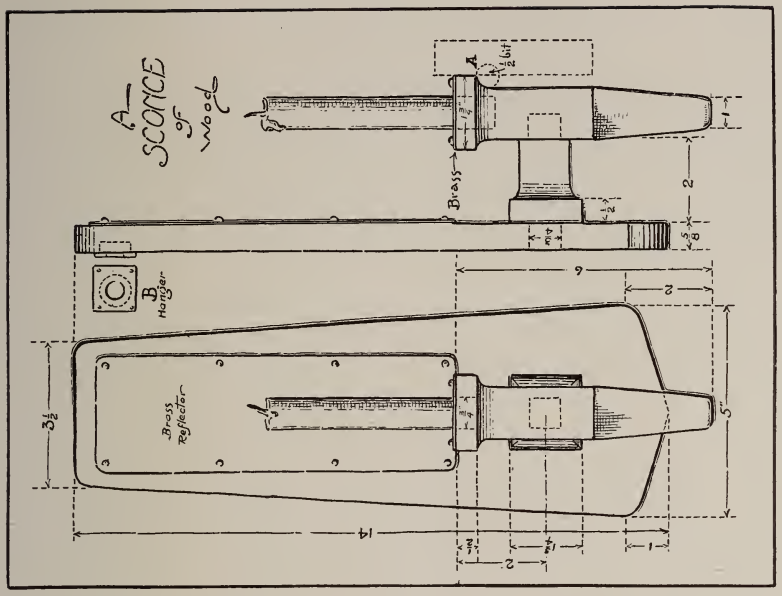
Fig. 2 illustrates "the square of the difference of two quantities is equal to the square of the first, minus twice the product of the first by the second, plus the square of the second."

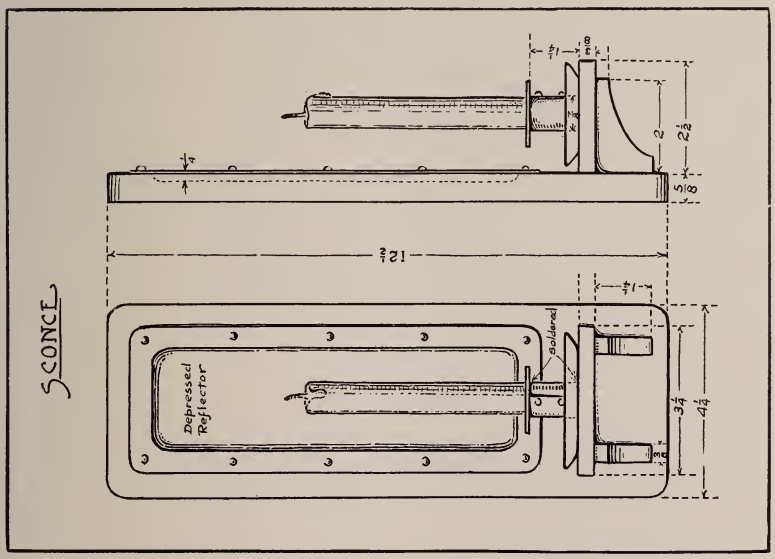
This probably will be the most difficult for the student to grasp, but if once understood will be the foundation for all problems of this sort.

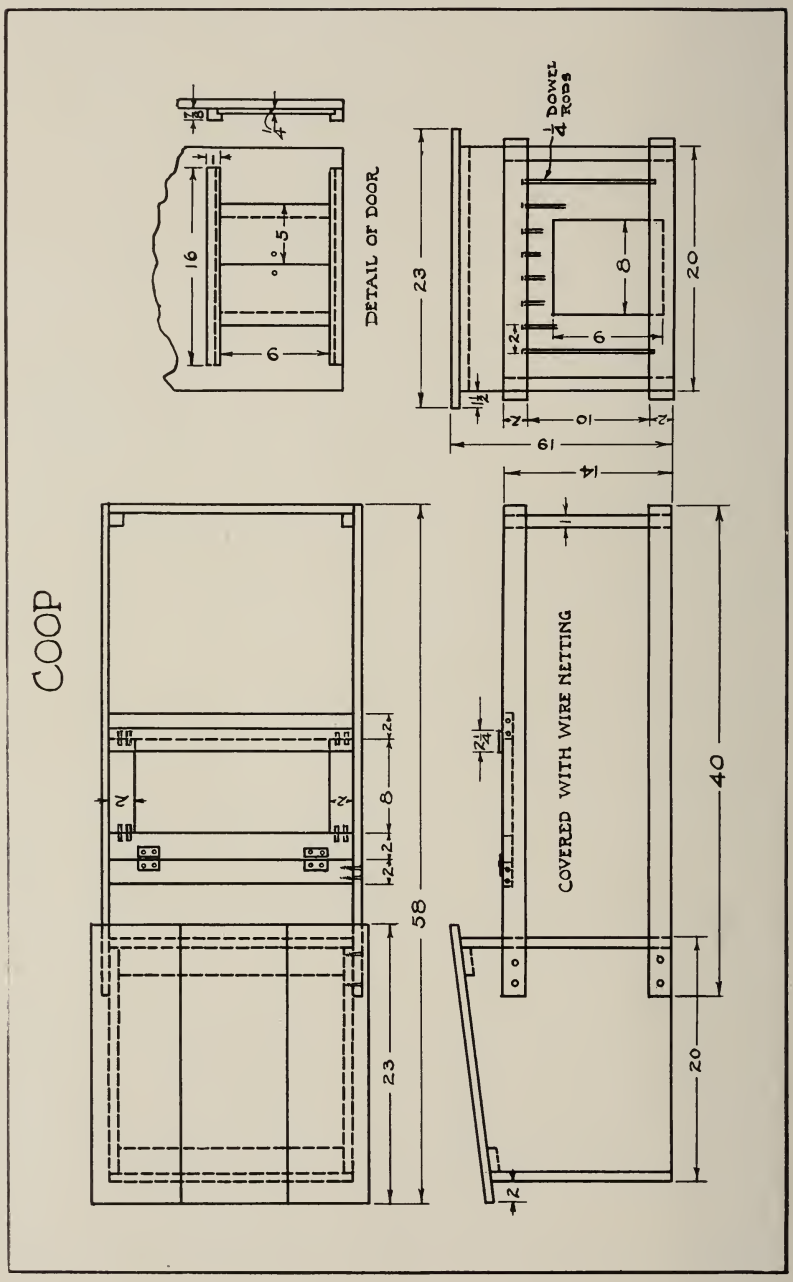
The first step in this problem is to construct the square whose area is equal to x^2. Then construct the smaller square whose area is equal to y^2. The two rectangles each of whose area is equal to xy are now subtracted leaving the square (shaded portion) whose sides are easily seen to be (x-y).

Fig. 3 illustrates the theorem "The product of the sum and the difference of two quantities is equal to the difference of their squares." In this problem construct the area x^2. From this take the area y^2 and by transposing the surface (x-y) y as per figure the rectangle (x+y) (x-y) will be completed.

—W. R. Hull, Pittsburg, Pa.


A
SCONCE
of
Wood
Brass
B
Hanger
C
Brass
Reflector
9
2
2
5
8
2
1
3½
5"
14
2
1


SCONCE
Depressed
Reflector
Soldered
12½
2
2½
5
8
3¼
4¼


COOP
DETAIL OF DOOR
16
5
6
23
Dowel Rods
8
20
6
61
4
COVERED WITH WIRE NETTING
40
58
23
20
2

SCONCES.

Clark Woodward of the State Normal School, Murfreesboro, Tenn., has contributed the drawings for the sconces (Page 325) which show a correlation between design, woodwork, and metal. The materials used are oak, 20 gage copper or brass, and escutcheon nails. The finish for the oak is fumed for copper, or a dark stain of the desired color for brass. In addition to the usual woodworking equipment these problems will require snips, drill and files. The method of forming the curves of the sconce at the right is indicated at A. where a piece of waste stock is clamped and the bit centered on the dividing line. The method of hanging to the wall is also indicated in the same sconce.

CHICKEN COOP

Every farmer raises more or less chickens. The incubator and brooder method is expensive and requires a great deal of patience and time, so most of the farmers stick to the old way of letting the hen do the hatching and brooding. Hence the necessity for suitable quarters.

The coop serves three purposes: (a) It is a hatching house, which may be closed at night, and furnishes the necessary runway for exercise. (b) It is a runway for the newly hatched chicks, for they must be kept in an inclosure for a certain period of time, under protection. (c) It is a home for the recently weaned chicks, especially at night, before they are old enough to roost with the other fowls.

The coop may be made of any soft wood. The house may be made of narrow pieces cleated together. The roof may be covered with tar paper, tin, or galvanized iron. The whole is assembled by means of screws, so it may be taken apart and stored for winter. Finished with two coats of paint, the coop presents a very neat appearance. The entire runway is covered with one inch mesh chicken wire.—L. Day Perry, Joliet, Ill.

REVIEWS

Primary Handwork by Ella Victoria Dobbs, assistant professor of manual arts, University of Missouri. Published by the Macmillan Company, New York, 1914; 7½x4¾ in.; 121 pages.

To the teacher who has reached the conclusion that the emphasis for primary handwork should be put on "content," this book will be of real service in suggesting things for the children to make and how to enrich these projects with the related subject matter. To the teacher who has not yet come to this way of thinking about elementary handwork the book will prove how unusually vital work thus stressed can become. The book is, in no sense of the word, a course, for the chief value of the work outlined is that it is elsatic, and suggestive, and can be dovetailed into the other work of the school day. It is a book that ought to stimulate as well as help the teacher.

Report of the Commission on National Aid to Vocational Education; Vol. I, Document No. 1004; House of Representatives; Sixty-third Congress, issued by the Government Printing Office, Washington D. C.

Part of the report is the draft of the bill which has been presented to the Senate by the Hon. Hoke Smith, chairman of the Commission, and to the House, by Representative Hughes. Summarized, the bill provides for the needs of vocational education thru the medium of national grants. These proposed grants are large, and, if the bill becomes a law, will put the United States on a par with the most progressive nations of the world as far as the practical education of its youth is concerned. The total Federal expenditure increases to a maximum of $7,000,000 a year in 1924, to be apportioned only among such states as meet the requirements of the plan, by themselves appropriating like sums for similar purposes.

The Thinking Hand or Practical Education in the Elementary School by J. G. Legge. Published by Macmillan and Co., London, 1914; illustrated; 7¼x10 in.; 217 pages.

This is an interesting account of the manual work in the public elementary schools of Liverpool. Beside discription, it contains syllabi and outlines of courses, and the last 110 pages are devoted solely to illustrations. These last are helf page photographs of the children doing a great variety of work in their manual training classes, and projects made by them. Characteristic of the work is the fact that is not formal, but related to the affairs of everyday life.

L'Année Pédagagique 1913. Edited by L. Cellérier and L. Dugas. Published by Felix Alcan, Paris, 1914; 9x5½ in.; 447 pages.

The third volume of this international pedagogical bibliography of current educational literature is just as comprehensive as the first two. In addition to classified brief reviews of 2680 books and magazine articles, it contains three introductory articles: the first on the end of education by Professor Rein of the University of Jena, the second on education for citizenship by Dr. Kerschensteiner of Munich, and the third on education from the social point of view by Professor John Dewey of Columbia University.

MANUAL TRAINING
AND
VOCATIONAL EDUCATION

FEBRUARY, 1915

INDUSTRIAL EDUCATION AND THE AMERICAN FEDERATION OF LABOR[1]

SAMUEL GOMPERS

AN argument, I take it, is not required of me in support of industrial education, nor any exposition of the purposes or ideals of industrial education. You know what industrial education is and what are its purposes and ideals. The question in your minds is perhaps with reference to myself as a representative of organized labor. Do I know what industrial education is, and what are its purposes and ideals? But since my personal knowledge is of very little consequence to anyone, except as a sort of reflex of the knowledge of the millions of workers, the question is, in fact, does organized labor understand what industrial education is, and what are its purposes and ideals? Finally, if it does understand these purposes and ideals, does it approve of them? And will it cooperate sincerely in the development of tried and proven rational schemes of industrial education?

A great part of my life and energy has been devoted to combatting wrong-headed notions about the attitude of organized labor with reference to every sort of social and economic question. These questions have increased in number and in variety with the development of industrial civilization. The need for efficient industrial education for our boys and girls is now more urgent than ever before. Nor is the need of educational training for greater efficiency confined to the factory or the shops; it is manifest in the home life, and in demands for instruction in domestic economy. The factory system and modern industrial organization have resulted in such high specialization that only what have been referred to

[1]Address delivered at the Eighth Annual Convention of the National Society for the Promotion of Industrial Education, Thursday evening, Dec. 10, 1914. Richmond, Va.

tonight as the tag-ends of industry have been left to women in the homes, and in modern industrial establishments the subdivision of labor has gone on to such a degree that workers perform the same set task a thousand, or ten thousand, or a hundred thousand times a day. The same task is automatically repeated again and again without knowledge of its relation to the rest of the industry for the sole purpose of gaining speed. I repeat that if ever industrial education was essential it is essential today. We cannot turn back the wheels of industry, but we can make the knowledge and the effectiveness of the workers such that they will have some comprehension of the entire article produced and of every branch of the production.

In this work I have sometimes felt that the presumption is always against labor—that it is always assumed as a matter of course that labor is by a sort of "natural depravity" and strange blindness, opposed to everything, including everything that is for its own best interests. Sometimes it is assumed that this opposition is due to a pernicious temperment on the part of labor leaders, and sometimes that it is due to simple ignorance and incapacity to understand complex social conditions. The workers are essentially honest and sincere, and permit me to assure you, the degree of their ignorance is not so great as the presumptuous and supercilious often assume it to be.

It may be difficult to cram into twenty minutes' time all that may be necessary to say with reference to the attitude of organized labor toward industrial education, but I shall endeavor to comply with limit set.

You should know that organized labor does not oppose the development of industrial education in the public schools. Indeed, that would not at all fairly indicate the attitude of organized labor. I say to you that the organizations constituting the American Federation of Labor have been for years engaged in the work of systematically providing industrial education to their members. This instruction has been given thru the medium of the trade union journals and schools established and maintained by them. Organized labor, I repeat, is not opposed to industrial education. It is eager to cooperate actively in instituting industrial education in our public schools. The workingman has too little time, and can therefore take but little interest in any other sort of education.

You will agree with me that there is absolutely no reason why labor, organized or unorganized, should oppose the sort of industrial education proposed here in Richmond, and I can assure you that labor

does not oppose anything without good reason. When it has good reason to oppose so many things why should it oppose anything without reason?

NEED TO DISTINGUISH BETWEEN PUBLIC AND PRIVATE INTEREST

Organized labor has opposed and will continue to oppose some enterprises which have been undertaken in the name of industrial education. It has opposed and will continue to oppose the exploitation of the laborer even when that exploitation is done under the name of industrial education. It may continue to regard with indifference, if not with suspicion, some private schemes of industrial education. With regard to such enterprises where they are instituted by employers, with a single eye to the profit of such employers, organized labor is from Missouri—it will have to be shown that the given enterprise is not a means of exploiting labor—a means of depressing wages by creating an over-supply of labor in certain narrow fields of employment.

Organized labor cannot favor any scheme of industrial education which is lop-sided—any scheme, that is to say, which will bring trained men into any given trade without regard to the demand for labor in that trade. Industrial education must maintain a fair and proper apportionment of the supply of labor power to the demand for labor power in every line of work. Otherwise its advantages will be entirely neutralized. If, for example, the result of industrial education is to produce in any community a greater number of trained machinists than are needed in the community, those machinists which have been trained cannot derive any benefit from their training, since they will not be able to find employment except at economic disadvantages. Under these conditions industrial education is of no advantage to those who have received it, and it is a distinct injury to the journeymen working at the trade who are subjected to a keen competition artificially produced. Industrial education must meet the needs of the worker as well as the requirements of the employer.

I can see that in some respects the most difficult task before industrial education is that of maintaining an equilibrium of supply and demand of efficient artizans, an equilibrium as nearly perfect as is physically possible. How shall this most difficult problem be solved? How shall such an equilibrium of labor supply and demand be maintained and industrial education entirely freed from any suspicion of working injury to labor by causing a maladjustment of supply to demand?

The answer to these questions seems obvious. There is in my opinion only one way in which to avoid this difficulty, only one way in which to avoid the danger of working serious injury to labor—working injury in spite of the very best intentions to benefit labor. The only way to avoid working an injury to labor under the name of industrial education is to find out what is the demand for labor in a community. In a word, it seems to me that the only safe basis for undertaking industrial education in any community is the basis which, as I understand, has been established here in Richmond. Industrial education should be in every instance based upon a survey of the industries of the community—upon an accumulation of facts regarding the employments in the community. Upon such a basis the public schools may properly proceed to provide for the particular industrial needs of the community, and with such an accumulation of data in hand there can be no excuse if industrial education does not prove to be of undoubted benefit to labor and to the community.

Industrial education comes close to the life and happiness of labor. It involves the means of livelihood for the workingman. The test of efficiency of industrial education is wage-earning power—not simply increase in efficiency of labor to produce. It is perfectly possible for industrial education, even when provided by the public schools, if it is not organized with regard to the industrial needs of the community, to increase the productivity and efficiency of certain groups of labor and at the same time reduce the wage-earning power of the laborers in those groups. There is nothing mysterious in this. It would result from the working of a universal economic law. To the extent that industrial education is not precisely adapted to the needs of the community, it will tend to have exactly this result, namely, it will increase the productive efficiency of certain groups of labor and by bringing into those groups an oversupply of labor will tend to economic deterioration.

I do not anticipate that any such results are at all likely to follow as a consequence of industrial education in Richmond. Why? Because Richmond has, as a preliminary to the establishment of industrial courses of instruction in its public schools, made an exhaustive survey of its industries. Richmond knows, as a result of this survey of its industries, what sort of industrial training will be of value for its youth, and Richmond is going to give that sort of industrial education as a result. I believe that the working men of Richmond as a body, all of them, in every field of industrial employment, are going to be benefitted by in-

dustrial education. I believe that these benefits will be apparent as an immediate consequence of that education and that each year those benefits will increase. I believe thus because Richmond has started right, and it is fair to assume that having started right, she will continue in the right way. And I can assure the people of Richmond that they will have the full support in this work of organized labor in Richmond.

ATTITUDE OF ORGANIZED LABOR HAS BEEN MISCONSTRUED

Isn't it absurd to assume that there will develop among the workingmen of Richmond any sort of opposition to this effort to make the instruction in our public schools democratic? Isn't it absurd to suppose that labor wants our public schools to go on in the future, doing as they have done in the past—teaching culture of a medieval type, a culture that has little bearing upon the life and welfare of the working people? Why should workingmen oppose a modification of the curriculum of the public schools to make that curriculum serve more fully the needs of workingmen? I can assure you that no disposition will be found any where among workingmen to oppose this effort to make our schools more democratic in serving the real bread-and-butter needs of the community.

Let me tell you further that labor—organized labor—has been active for years to secure this end, active in its effort to make the public schools do precisely that which some misinformed people even think labor opposes. In 1903 the American Federation of Labor at its annual convention appointed a committee on education. What sort of education do you think most interested the delegates to that convention? It was not that education which deals with the syntax of dead languages; it was not even that education which deals with the development of the fine arts, or with the systematic teaching of the sciences. These are all of them legitimate ends of education, and the American Federation of Labor approves of these educational ends, but the sort of education which the A. F. of L. was particularly interested in, and the sort of education which was under consideration when this committee on education was appointed in 1903, was industrial education. This was more than a decade ago and during the entire period which has elapsed since the appointment of that committee the A. F. of L. has been active in fostering and furthering every legitimate enterprise for the industrial education of workers.

I will ask Mr. Prosser how long the National Society for the promotion of Industrial Education has been working in this field. (Mr. Prosser answered "About eight years.") We have been working for industrial education for more than a decade. This committee appointed in 1903 was to consider what the trade unions themselves could do to make up for the deficiency of the public schools. The members of the trade unions felt the need of industrial education. This sort of education was not provided by the public schools. The trade unions whose members paid taxes to support the public schools were not getting from those schools the sort of education which they needed to enable them to become skilled, efficient, and better paid workingmen. They were getting, in so far as they got anything at all, a sort of education which had for them very little value, and they therefore took under consideration the possibility of organizing a scheme of education which would be of value to them.

Now when the public schools come forward with a proposition to provide the sort of education needed by the workingmen, do you think that they are going to oppose that undertaking? I do not think so. In fact I know that they will welcome any such development.

OFFICIAL ACTION BY THE FEDERATION

In 1904 another committee on education was appointed, and again in 1905 another committee, and again in 1906. In 1907 the A. F. of L. at its annual convention resolved that "we do endorse any policy, or any society (this I may state included and had especial reference to the National Society for the Promotion of Industrial Education) or association, having for its object the raising the standard of industrial education and the teaching of the higher technic of our various industries."

The committee to which this resolution was referred, reported it "decided to record itself in favor of the best opportunities for the most complete industrial and technical education obtainable," and it recommended an investigation of industrial school systems.

In 1908 the committee on education tested "with satisfaction the splendid progress accomplished by the Executive Council along the lines of industrial education," and submitted to the convention a set of resolutions in which it stated that industrial education is "necessary and inevitable for the progress of an industrial people."

Industrial education was before the convention of 1909, at which time I myself stated in my report that the A. F. of L. favored public

industrial education, and opposed only narrowly specialized training under the control of private interests. Organized labor has always opposed and will continue to oppose sham industrial education, whether at public or at private expense. It has opposed and will continue to oppose that superficial training which confers no substantial benefit upon the worker, which does not make him a craftsman, but only an interloper, who may be available in times of crisis, perhaps, as a strike breaker, but not as a trained artizan for industrial service at other times. Industrial education must train men for work not for private and sinister corporation purposes.

I do not refer to this for the purpose of introducing any note of discord into this meeting, but simply by way of explaining what it is that has at times in the past aroused labor's opposition to what has been unfairly called industrial education. It will be found that wherever labor has opposed what has been put forth as industrial education, the enterprise called industrial education has been something entirely different from that which Richmond is instituting in its public schools today.

To the 1909 convention of the American Federation of Labor I took pleasure in submitting this: "That since technical education of the workers in trade and industry is a public necessity it should not be a private, but a public function, conducted by the public, and the expense involved at public cost." You people in Richmond are doing today precisely what the committee of the A. F. of L recommended five years ago should be done.

In 1911 the A. F. of L. came forward in support of a bill in Congress providing for national aid in establishing vocational education in the public schools of the country. Since that date up to the present time the A. F. of L. has consistently, persistently, and unremittingly advocated the establishment of industrial education in the public schools.

I challenge any one to produce evidence that organized labor has at any time, or in any instance, ever opposed, or failed to support the institution of industrial education in the public schools. Organized labor is not so stupid as to oppose its own advancement. What possible motive could it have in opposing education organized solely with reference to its own advancement? None whatever.

The sort of industrial education which Richmond is instituting is the one and the only sort of industrial education which can enlist the sincere cooperation of trade unionists and should receive the cooperation of employers as well. It is equally to the interest of the employers as

of labor, that workingmen shall be trained for real efficiency. The efficient worker produces more, and by virtue of his efficiency makes for a higher economic, industrial, commercial, and social development. I believe that the welfare of labor depends to a very large extent upon the development of industrial education, and that in this case at least, the welfare of the employer, and of the community is equally involved with that of the workingman. In the matter of industrial education there is absolutely no controversy between labor and the employers of labor—provided always that the industrial education is what it purports to be, industrial education, organized by the public schools for the benefit of the youth of the community. Organized labor represents the fathers and mothers of these youths, and the fathers and mothers are not going to oppose the best interests of their own children.

Those who wish documentary proof that organized labor has for years been actively agitating for the institution of industrial education in the public schools, I shall be very glad to provide with such proofs. They are spread through the annual reports of every convention held by the A. F. of L. beginning with that of 1903, and including that of 1914. In 1910 the Federation published a preliminary Report on Industrial Education, and in 1912 a full report of its Committee on Industrial Education, approved in conformity with a resolution of the convention held in Denver, 1908.

EDUCATION AND INDUSTRIAL COMPETITION

Let us approach this question from an entirely different angle in order to bring out clearly labor's interest in the development of industrial education.

American industries are producing in competition with the industries established in other countries. In normal times, when these other countries are engaged not in warring upon one another with wonderfully ingenious and effective instruments of wholesale murder, they are none the less strenuously engaged in a warfare of industrial competition. I use the word "warfare" in this connection because no other term seems adequately to sum up the strains and rivalries of industrial competition between nations, but I would not wish you to assume that I think that there is any very close analogy between the conflicts of organized militant wholesale murder and the contests of industrial competition. Industrial rivalry is beneficient, not malign; it is a condition of social progress, not of rapine and destruction.

Industrial competition and rivalry is a condition of improving material welfare, and of advancing civilization. In a word, industrial competition is a warfare of progress, and in this warfare no nation can miantain its industrial supremacy, nor can any nation insure the progressive improvement in the material welfare of its people, which does not adopt the most modern methods and the most effective devices of the industrial world struggle.

It is well known to you, who are all of you informed regarding the development of industrial education, that this sort of education has been adopted very generally by those great nations with which the people of the United States—the workingman as well as the employer of labor——must compete. Industrial education of the workers, even extending to workers in the unskilled employments, has been, for example, Germany's chief method of industrial conquest. With this means Germany has entered not only foreign markets, but even our own domestic market in many lines. What does that trade mark with which we have all become so familiar in recent years "Made in Germany" mean? It means simply industrial education of the workers of Germany. Largely by virtue of that sort of education, Germany has been enabled to produce commodities and to place them in our own markets, and in many cases has been enabled to displace the American product.

This successful competition of Germany does not mean that Germany has depended upon cheap labor to enable her to produce cheaply. We can compete with cheap labor in any line, because cheap labor is in fact, and in the last analysis not cheap labor at all. On the contrary, it is the most expensive and the least profitable sort of labor. No community which depends upon cheap labor in the sense of underpaid labor can win out in international competition against a nation which depends upon intelligent, thoroly trained labor. Thoroly trained labor produces cheaply not because it is underpaid but because it is efficient. And thoroly trained efficient labor can demand high wages because of its intelligence, efficiency, and organization.

Is it not clearly to the interest of the workingmen of the United States that they shall be put upon the same level of competition as that occupied by workingmen in foreign countries with whom they must compete? Are not the workingmen vitally interested in maintaining American industries in competition with foreign industries? If these industries decline it is the American workingman who is thrown into the ranks of the unemployed—the American artisan who is depressed into the ranks

of the unskilled. In this process the standard of skilled labor is degraded, and unskilled labor is subjected to a new sort of competition which inevitably weakens its condition. The process of industrial progress is reversed. Instead of making the skilled workman more skilled and at the same time lifting the unskilled worker into the ranks of the skilled, the skilled worker is forced down into the congested mass of unskilled labor.

Perhaps, however, even this deterioration of labor is not the chief consideration. No civilized nation can maintain its self-respect on any other basis than that of competing in industrial rivalry on the basis, not of ignorance but of intelligence, on the basis not of cheap labor, but of efficient, well trained labor, on the basis not of brute physical manual labor, but of skill and proficiency.

We do not wish to compete with Europe as the Chinese compete with the whole world. We could not do that and retain our self-respect. We could not do that without adopting Chinese methods of work, which would mean a minimum of rest and food, no recreation, and a maximum of hours of labor. If we are not willing to adopt Chinese methods, we must adopt weapons of industrial progress which has enabled European nations to advance in material welfare in competition, not only with the Orient, but more especially in competition with the United States, and with other countries which have had available as a basis of industrial development vast natural resources. The period is almost past when the United States can depend upon cheap raw materials obtained with comparatively little labor from its mines and virgin fields. It is entering upon a period when it must depend upon the qualities of human labor. Under these conditions industrial decline is the only alternative to industrial education. Do you think that organized labor is going to advocate a policy of industrial decline—a policy of competing on a basis of cheap labor, instead of trained and efficient labor? Do you think it is going to advocate the adoption of Chinese methods in its competition with Europe? I can assure you that the American workingman will not accept any such solution of the problem. He will insist that competition shall be upon the basis not of cheap brute labor, but of intelligent efficient skilled labor, which means that he will in the future, as he has done in the past, insist that the instruction in our public schools be made democratic; in a word, that the public schools generally shall institute industrial education, and that that education shall be based upon an exhaustive study of the industries to determine what sort of indusrial

training is required and is most conducive to the physical, mental, material, and social welfare of the workers, the community, and that which holds out the best hope for America's workers, her citizenship, the perpetuity of our republic, and fulfilment of its mission as the leader in the humanitarianism of the world.

NOW IF EVERY INDIVIDUAL IS TO CONTRIBUTE BY MEANS OF HIS WORK TO THE GENERAL WELFARE OF THE COMMUNITY, OUR FIRST BUSINESS MUST BE TO PROVIDE HIM WITH THE BEST OPPORTUNITIES OF DEVELOPING HIS SKILL AND CAPACITY FOR WORK. BUT THE DEVELOPMENT OF SKILL IN HIS CALLING MUST NOT BE PLACED ONLY IN THE SERVICE OF INDUSTRY, OR LIMITED BY INDUSTRY. ITS FIRST OBJECT IS THE DEVELOPMENT OF A MAN'S OWN JOY IN WORK AND THEREBY OF HIS JOY IN LIFE. FOR TRUE JOY IN WORK CAN ONLY GROW OUT OF REAL CAPACITY FOR IT. THUS THE SKILL IN WORK AND THE CONSEQUENT JOY IN WORK THAT ARE CULTIVATED IN OUR TRADE SCHOOLS PROVE THEMSELVES EDUCATIONAL FACTORS OF THE VERY HIGHEST IMPORTANCE. THROUGH THEM WE ARE ABLE TO APPEAL TO THE HEARTS OF THE BOYS AND GIRLS OF OUR WORKING CLASSES. WE CAN EDUCATE NO ONE WHO IS NOT HAPPY IN HIS WORK; AND THIS IS THE POINT WHERE WE CAN INTIMATELY COMBINE GENERAL AND TECHNICAL EDUCATION. AND THERE IS NO OTHER WAY OF DOING THIS.—

Dr. Georg Kerschensteiner.

DETERMINING THE OCCUPATIONAL DISTRIBUTION OF THE LOCAL POPULATION

Charles L. Jacobs

AMONG the many perplexing problems which confront those who are attempting vocational guidance in its various forms is that of determining the distribution of the local population from the standpoint of occupations. For large cities and for states such a distribution can be secured thru the United States Bureau of Statistics, but in small communities it is necessary for the investigator to make this determination himself.

It must be noted at the outset that by the term local distribution we include not merely the town for which the individual is making the tabulation, but also the nearby communities in which youths of the locality are likely to find or look for employment. For example, in our own case it was not only necessary to find out the distribution of the population for the city of San Jose, but also for the county of Santa Clara; and since a good number of our boys go to San Francisco for employment, we find it essential to take into account also the occupational distribution in that city, which is fifty miles from San Jose.

To secure our statistics of the Santa Clara valley practically without cost, we proceeded in the following manner. For each two of the boys who were to work on the study, there was secured a city and county directory. Each pair was supplied with several thousand small slips of paper about five inches in length and three-fourths of an inch in width. These slips were obtained by cutting lengthwise into four parts, bunches of common yellow paper pads that came three inches wide and five inches long. The workers were instructed that one of each pair would have to write while the other read, and after a quarter of an hour it would be best to change, so that the boy who first wrote would then read, and vice versa. The directory was then divided according to the number of pairs of boys working upon it, so that each pair had an equal number of pages to cover.

When this preliminary work was completed, the reader of each pair started at the beginning of the section assigned to them and read the occupation of each person listed, while the writer recorded each reading on

a separate piece of paper, regardless of the number of times the occupation may have been mentioned. The names of the persons whose occupations were recorded were wholly ignored.

When all of the occupations of the persons named in the directory were thus recorded, shoe boxes were obtained and lettered on the inside with the letters of the alphabet. Combinations of letters were used where it was likely that not many occupations would be found with those initials. Thus, for example, IJ, NO, PQ, UV, and XYZ were combined for separate boxes. The letters were placed on the inside of each of the four sides so that the box could be easily distinguished from any side. The boxes were then put in alphabetical order around an oblong table so that every one of them could be easily reached by each of the workers. The boys then, with their bunch of papers, stood around the table and dropped each of the slips into the proper box, according to the initial letter; for example, labor was put in box L, physician in box P, and so on.

When the thousands of slips had been properly disposed of, each pair of boys then took its equal share of the number of boxes and began to record the number of persons engaged in each of the occupations. At this time, one boy acted as the reader and the other as the teller. The papers were picked out of the box indiscriminately, and when an occupation was called off for the first time it was written down and thereafter checked and tallied, as is ordinarily done in recording votes.

Thus, when this stage of the work was completed, we had a list of all the occupations engaged in by people of the valley, and we knew the number of persons engaged in each. Each occupation then was written on a separate slip of paper with the number of persons engaged in it and the slips were divided into classes according to the custom of the United States Bureau of Statistics; namely, agricultural pursuits, professional services, domestic and personal services, trades and transportation, manufacturing and mechanical pursuits. Finally the occupations in each class were put in alphabetical order. To give a clear idea of how this division appeared when completed we add below the results of our own survey.

THE DISTRIBUTION OF THE POPULATION OF SANTA CLARA VALLEY ACCORDING TO OCCUPATIONS—1913

AGRICULTURAL PURSUITS	3,054
Dairymen	76
Entymologists	2

Farmers	1,051	
Gardeners, florists and nurserymen	203	
Horticulturists	8	
Orchardists	1,447	
Poultrymen	42	
Ranchers	105	
Stockmen	73	
Vineyardists	47	
PROFESSIONAL SERVICE		1,784
Actors	11	
Architects, designers and draftsmen	54	
Artists	38	
Astronomers	3	
Clergymen	89	
Dentists	70	
Electricians	121	
Embalmers and undertakers	17	
Government officials	99	
Inventors	4	
Journalists and editors	49	
Lawyers	124	
Librarians	26	
Literary and scientific workers	10	
Musicians and teachers of music	89	
Notary publics	4	
Opticians	11	
Physicians	168	
Teachers and professors	797	
DOMESTIC AND PERSONAL SERVICE		5,003
Auctioneers	5	
Bartenders	146	
Boarding and lodging house and hotel keepers	111	
Bootblacks	36	
Barbers and hair specialists	338	
Cooks	76	
Detectives	4	
Firemen	100	
Housekeepers	35	
Janitors and Sextons	90	
Laborers and employees (unclassified)	3,203	
Nurses	224	
Policemen	37	
Porters	71	
Restaurant keepers	54	
Servants and waiters	337	
Soldiers and sailors	8	
Stable keepers	38	

Stewards	10
Watchmen	50
TRADE AND TRANSPORTATION	5,819
Agents	78
Baggagemen	50
Barnmen	10
Bookkeepers, auditors and accountants	391
Brokers	145
Conductors	290
Clerks and copyists	1,219
Draymen, hackmen and teamsters	690
Foremen	169
Flagmen and signalmen	27
Garage owners	12
Gatemen	4
Harness and saddle makers and repairers	31
Hostlers	69
House movers	14
Inspectors	14
Linemen	46
Messenger and bell boys	47
Merchants	
Autos	5
Awnings	3
Bicycles	19
Books and stationery	22
Cigars	69
Clothing	9
Drugs	46
Groceries	168
Feed and fuel	38
Junk	2
Millinery	48
Paints	9
Pool and billiards	11
Saloon	87
Unclassified	184
Officials of banks and companies	505
Oilers	5
Peddlers and hucksters	51
Post office employees	68
Real estate dealers	109
Salesmen	654
Stenographers	222
Telephone operators	36
Warehouse keepers	22
Yardmen	21

MANUFACTURING AND MECHANICAL PURSUITS		3,664
Advertisers	5	
Basket makers	5	
Bottlers	21	
Blacksmiths	188	
Bookbinders	15	
Boilermakers	8	
Brewers and maltsters	54	
Bridge builders	35	
Butchers	79	
Butter and cheese makers	17	
Cabinet-makers	62	
Carpenters	576	
Carriage and wagon manufacturers	17	
Cement workers	101	
Confectioners	36	
Contractors and builders	150	
Coopers	21	
Chauffeurs	33	
Dyers and cleaners	53	
Engineers—		
Civil	24	
Electric	2	
Marine	2	
Steam (unclassified)	235	
Surveyors	10	
Engravers	6	
Fishermen	8	
Foreladies	14	
Foundrymen	3	
Gas manufacturers	7	
Geologists	3	
Glass workers	11	
Glove manufacturers	7	
Gun and locksmiths	7	
Ice manufacturers	2	
Jewelers	57	
Lathers	15	
Lumbermen	12	
Laundry workers	146	
Leather workers	53	
Machinists	59	
Manufacturers (unclassified)	22	
Marble and stone workers	27	
Masons	35	
Mill Hands	133	
Miners	60	

Packers and canners of meat and fruit	126
Paste manufacturers	16
Painters	292
Potters	17
Printers	120
Plumbers	150
Plasterers	43
Photographers	39
Seamstresses	189
Sheet metal workers	7
Shoe makers and repairers	88
Tailors	76
Upholsterers	20
Vulcanizer	1
Well borers	21
Window trimmers	11
Wire manufacturers	3
TOTAL	19,334

It must be confessed that this method does not give a completely reliable record of the division of the people of the community among the various occupations. The directory, of course, does not contain the names of all the people in the community; and, generally, the larger the community the smaller the proportion included in the directory list. In our case, the directory list records but one-fourth of the entire population of the locality studied. Still, where a more extended means for the determining of occupational distribution is not at hand, the method described in this article makes a splendid substitute. It is, at least, a way of determining the local occupational conditions which is within the range of any investigator. It thus puts in the hands of every one anxious to know the vocational distribution of this locality a ready method.

SIMPLIFIED JEWELRY WORK—II[1]

Arthur F. Payne

IN the October issue, 1914, in the first article of this series, instructions were given in the making of finger rings of gold and silver wire. Neither the possibilities of ring making, or the possibilties of wire as a medium of construction were by any means exhausted.

The scarf pins shown in Figs. 9 and 10 are illustrations of what may be done easily and quickly with a limited equipment. The small round balls that are used in the construction of these scarf pins, are solid balls made by melting scraps of silver or filings on the charcoal or asbestos block. Borax paste, the same as that used in soldering, must be placed on the silver, and when the flame is directed on to the silver with sufficient heat it will melt and roll up of its own accord into a round ball. If two or more balls of the same size are desired, the silver should be weighed or measured to insure their being the same size, or if it is desired to match one already made, a small one should be melted first and then small pieces of silver added until it is of the required size. Another good method is to make a number of different sizes and then pick out those that match, reserving the rest for future use. Balls made in this way will always be flat on the under side.

When soldering together an object made of a number of small pieces it is often of decided advantage to use solder filings instead of the small square pieces of solder mentioned in the previous article. These filings may easily be made by filing a piece of the solder, catching the filings in a dish or on a piece of paper. They are mixed with a small amount of the borax paste and applied to the work with a brush. The filings will melt with less heat and make a neater job of the soldering. Another method that will help a beginner when soldering together small pieces is to push the pieces part way into the surface of the charcoal block, this will hold them in position when soldering. It often happens when the heat is applied to a piece of work for the purpose of soldering, that the borax will rise and swell, carrying the pieces out of position. Sometimes the pieces settle back into position as the borax melts, but if they do not, they can be pushed into place by using a poker made of iron wire. The flame must be kept on the work to keep the borax melted as the pieces are being moved.

[1]Copyright, 1915, by Arthur F. Payne.

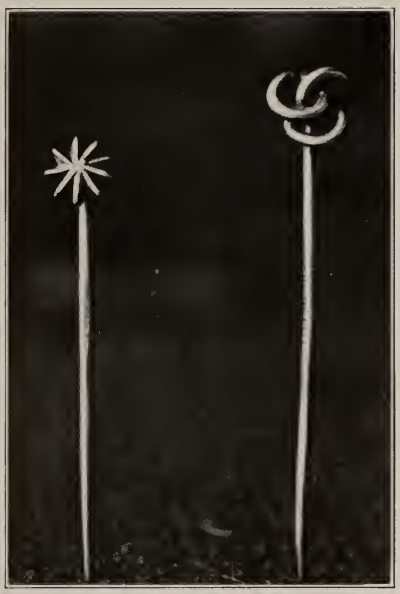


FIG. 9

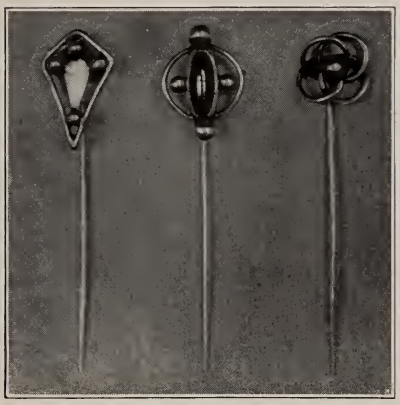


FIG. 10

The rings in Fig. 11 were made by students who followed the directions given in the previous article. The scarf pin on the left, Fig. 11, was made in the manner just described, and the one on the right is an interesting piece of work because of the fact that the only tools necessary are two pairs of pliers, no soldering being needed. It is a knot made like No. 6, Fig. 8,[2] one end of the wire being used as the pin, the other end is bent downward and pushed back thru the knot and the end cut off.

FIG. 11

SOLDERING

The pin of a scarf pin is usually a little troublesome for beginners as it must be left perfectly smooth and stiff with a sharp smooth point. The best method of soldering a pin to a scarf pin is shown in Fig. 12. A piece of wire a little longer than necessary for the pin is taken and a small loop is formed on one end with the round nose pliers. This loop is flattened a very little with a file on the side that is to be soldered, and then it is placed on the charcoal block, as shown, with the end of the wire pushed into the charcoal block to hold it firmly in position while it is soldered in place. After it is soldered the pin is bent straight out, as shown by the dotted lines at No. 2. It is cut off to the required length and then

[2]See MANUAL TRAINING AND VOCATIONAL EDUCATION, Oct., 1914, p. 96.

stiffened by hammering very lightly and evenly on a smooth piece of iron with a smooth hammer. Care must be taken to turn the pin continually while hammering so as to retain the round form of the wire. Next file a smooth point on the pin and polish the pin stem and the back of

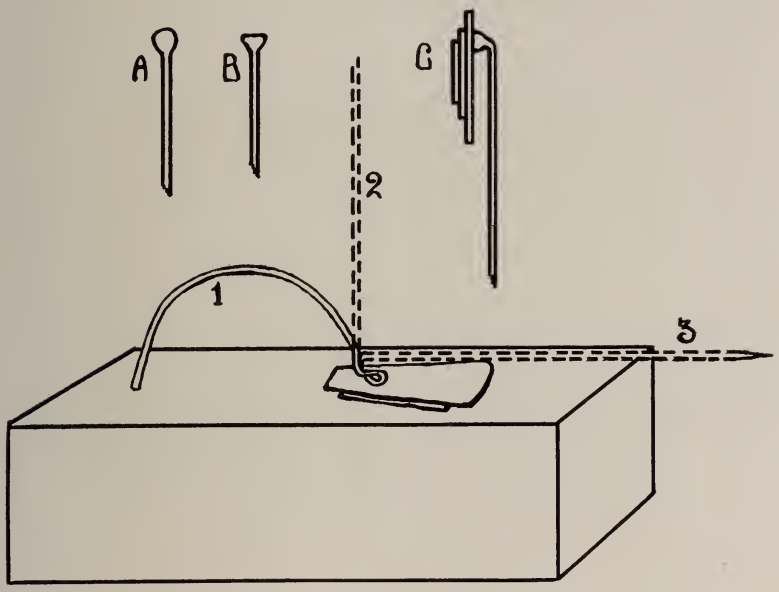


FIG 12

the pin head, then bend the pin carefully with the round nose pliers to the last form shown by the dotted lines, No. 3.

If the pin head is made of wire of such shape that the pin stem cannot be looped for soldering, the method shown in A, B, C, Fig. 12, may be used to good advantage. The extreme end of the wire is melted until a small ball is formed; this is filed flat and soldered on; then follow the steps, 1, 2, 3, as described for the looped pin stem.

So far we have used only wire and balls in these elementary problems. Later in the series we shall develop the possibility of wire in the form of filigree work, but at this time it is more logical to consider the use of small pieces of flat metal as a means of making simple jewelry. It is more logical to do this because the beginner in this work needs to acquire facility and freedom in handling the elementary processes and tools before taking up the more advanced work.

Figs. 13 and 14 give an idea of what can be done by beginners with flat metal. The photographs need but little description. The pieces are made up of three pieces of silver, 19 gage thickness, cut and filed to shape, bound together with iron wire and soldered together. The decorative possibilties of the file may be made use of by beveling the corners with the file, as shown.

FIG. 13

SAW-PIERCING

The next step in the sequence of processes brings us to the interesting process of saw-piercing. This process requires care in observing a number of details, otherwise the beginner will break the small fine saws. To place a saw in the saw frame, first be sure that the teeth point toward the handle. Fasten the saw in the top clamp of the frame and push the top of the frame against the edge of the table or bench, as shown in Fig. 15. The frame will give or spring just a little. Fasten the lower end in the bottom clamp. When the pressure is released, the spring of the frame will pull the saw tight. The saw will break in the work if it is not stretched tightly. Use Number two jewelers saws, costing ten cents a dozen, and a saw frame four inches deep, costing about ninety cents.

Prepare a piece of board about ½″ thick and 3″ wide and 8″ long with a V-shaped notch cut in one end, as shown in Fig. 16. This board is fastened to the bench with a clamp or with screws. Hold the metal

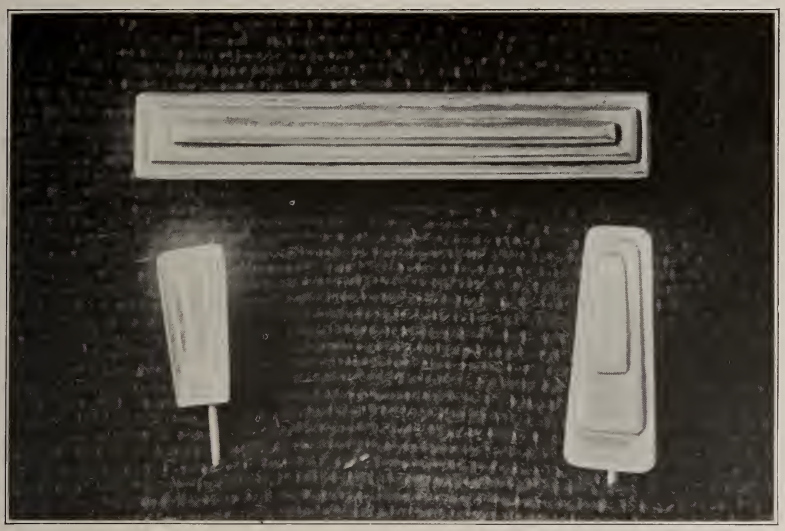


FIG. 14

flat on the board with the saw in the V-shaped opening and start sawing, remembering that the cutting is all done on the down stroke. Be sure to keep the saw blade at right angles with the metal and moving at about the rate of two strokes per second. When changing the direction of the saw always keep it moving up and down. This is very necessary as the saw will break if it is twisted or turned while stiff. It is advisable to practice sawing on a piece of copper and brass before starting on the silver, as good saw-piercing comes only thru control of the saw, and that is only acquired by practice.

To saw out the ornamental openings in a piece of work it will be necessary to punch a small hole thru the metal with a prick punch (a drill will do this work better if one can be used). Unfasten the saw from the bottom clamp and insert the saw in the hole in the metal, spring the frame again, fasten the saw in the bottom clamp and proceed to saw as before.

The saw-piereced finger rings, Fig. 17, are very easy to make after one has acquired a little skill in sawing. The first thing necessary is a

design for the ring drawn out flat on paper, as shown in Fig. 18. In making the preliminary sketches it is necessary to draw only one quarter-section of the design. Two mirrors placed at right angles to each other

FIG. 17

on the section lines will enable you to see just how the completed design will look. The paper may then be folded on the section lines, and the

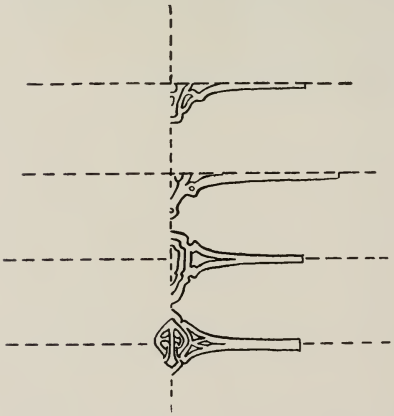


FIG. 18

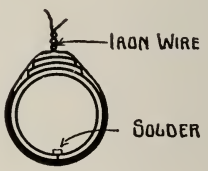


FIG. 19

design rubbed over to the other sections. In this way we are sure that all sides are symetrical.

The design is next glued on to the piece of metal, the holes punched and sawed out, and lastly the outline sawed out. The extra piece is then sawed out and soldered on. This extra piece is often made of gold and may take the form of a beetle, monogram, initial, flower, and the like.

The ring is next bent around the mandrel and the ends cut off to the correct length, bound together with iron wire, Fig. 19, and soldered. It is then filed, cleaned, and polished, as described in the October issue.

FIG. 21

FIG. 20

Fig. 20 indicates the possibilties of this same method in making scarf pins. Fig. 21 shows a pendant and a brooch made by saw-piercing the decorative piece of silver and soldering it on to a plain piece for a background.

A very good combination is to saw out a design in silver and solder it on to a piece of copper for a background. When the piece is oxidized and relieved, the color harmony of the brown of the copper and the gray of the silver is very pleasing. This method also reduces materially the cost of the materials used.

This series has so far illustrated and described five definite processes used on elementary problems. These processes are fundamental in jewelry making and will be used continually. Jewelry making is of decided vocational value in certain localities, and in others is of definite educational value because it offers perfect correlation with drawing and art training, and because it brings out the individuality of the student as few other subjects do; it affords a perfect means of self expression, and trains the student's power of visualization and imagination, and developes his creative and inventive thought.

THE RUNNING STITCH OR NEEDLE WEAVING

ESTHER W. WUEST

IF there is one thing that stands foremost, and appeals to the majority of children, it is the bringing of beauty to the useful product. To be able to make something useful, and beautiful as well, is ample reward for the time, thought and energy spent in any phase of handwork.

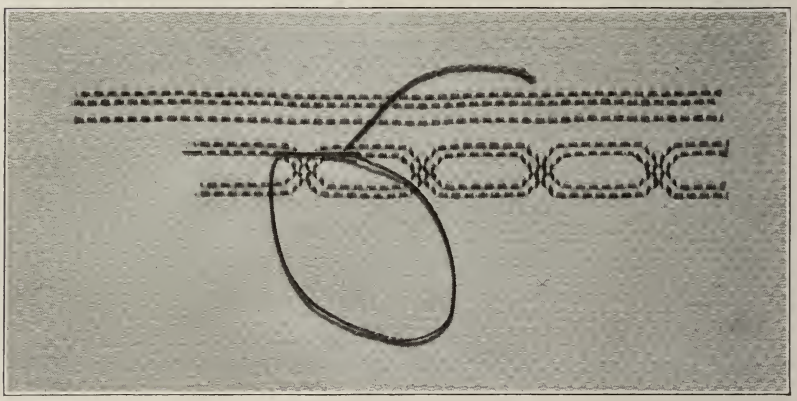


FIG. 1

It is the purpose of this article to present a form of handwork which has three important points in its favor; namely, simplicity, inexpensiveness and education.

The process of the running stitch is simplicity itself, and its possibilities seem unlimited. It is within the grasp of any child who can use a needle. It is inexpensive for there is no elaborate equipment required, only a simple tool, a needle, some loosely woven material, and a bit of colored cotton. But oh! what ingenious fingers can do with the simple running stitch! It is educational for it developes the creative faculty and promotes the acquirements of good taste. With the effort to create, the knowledge of what is pleasing in decoration and in color is developed.

The Stitch. The stitch is continuous weaving in and out, either on

one side of the material, as in the huck toweling, Fig. 1, or showing on both sides of the material, as in the scrim, Fig. 2.

The Design. The design is best developed on squared paper. Begin exercises by making simple *continuous* straight-line borders. Take plenty of time to design a number of different arrangements in order to have a selection. The purpose of design is to add interest to construction, and it must, therefore, be pleasing in space relations and in

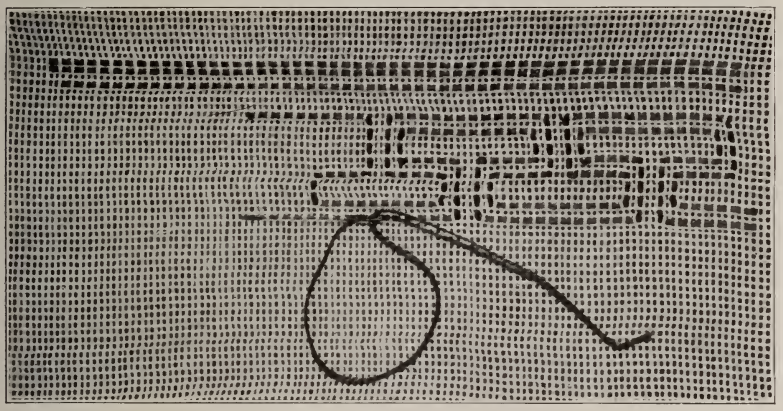


FIG. 2

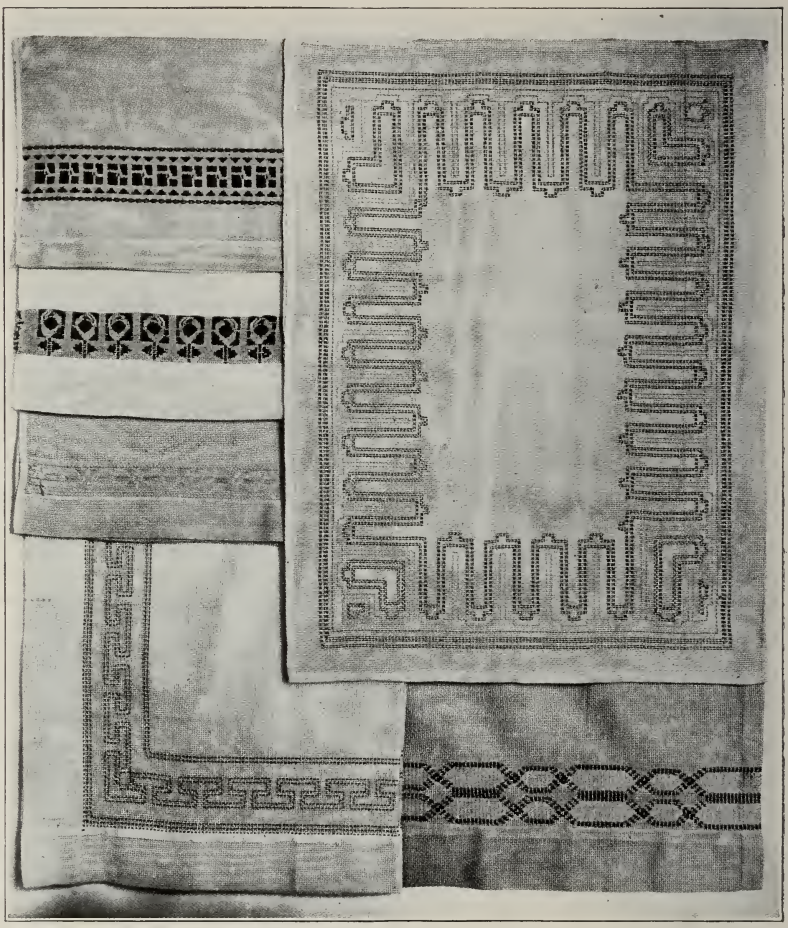
proportion. If we would only realize the charm of simplicity, how much more restful our surroundings would be to look upon.

The Materials. The regular inexpensive huck toweling may be used for many problems, and forms an excellent basis for the running stitch. Ordinary curtain scrim and net will serve as a foundation for weaving many beautiful patterns for various purposes. Threads may be drawn, and colored ones inserted, giving pleasing border effects. Burlap, monk's cloth, loosely woven crash, and other materials may be used with the designs woven on one side as in the huck toweling, or showing on both sides as in the scrim. Spool or skein cotton, wool, yarn, or silk floss of varied coloring may be used for weaving, and herein lies the whole secret of the success of the work, your color combination selected in harmony with the foundation material. Just as much depends on the harmony of color as on the design. (The safest way is to use as few colors as possible.)

For Weaving, use any blunt pointed needle with large eye. Tapestry needles may be obtained in many sizes and are very satisfactory.

ON HUCK TOWELING

WOVEN DESIGNS



DESIGNS WOVEN IN SCRIM AND NET

Problems. There are many useful articles to which this form of decoration is particularly suited. Huck toweling may be used for the following:

Towels of all kinds.
Sewing aprons.
Bags that can be washed.
Children's bibs.
Mats for hot dishes.
Holders of various kinds.

From scrim may be made:
Curtains and dresser scarfs.
Table runners.
Pillow covers.
Collar and cuff sets.
Bags of all descriptions.

In conclusion, consider the joy which may be brought into the lives of many little folks by means of a simple process that beautifies their every day surroundings. Is it not right that they should rejoice in the work of their own hands?

"THERE ARE FEW THINGS OF BEAUTY IN OUR HOUSES, FOR MOST OF OUR HOUSES ARE MERE WARE-HOUSES."

ADVANCED PATTERN-MAKING AND MOLDING—HOW AND WHAT TO TEACH—III

Fred D. Crawshaw and Walter Chisholm

MACHINE MOLDING

MANY mechanical ideas are being developed in order to reduce manual labor in molding to a minimum and at the same time to increase output. The sum total of these constitute machine molding. The term "machine molding" should not be interpreted too literally, for very few molding machines are, in the full sense of the word, wholly mechanical. For example a hand press which simply squeezes sand in a flask is termed a machine; an apparatus which, by means of a lever, draws a pattern plate from a flask rammed by hand is also termed a machine. Each molding machine, no matter how perfect its mechanism, requires a high degree of skill on the part of the pattern-maker in setting patterns and pattern boards, and a certain amount of skill on the part of the operator of the machine. Two very simple and inexpensive molding machines are described below:

Fig. 19 shows a type of machine which has the pattern board fixed to the table of the machine. The drag is placed over the pattern board and is rammed by hand. The bottom board is then clamped and by the aid of a hand wheel the table is revolved and the mold is lowered away from the pattern board.

In the machine shown in Fig. 20 the pattern boards for both cope and drag are fixed on the platform of the machine. The cope and drag are placed in position and sand is shoveled into them until they are heaping full. Then presses, actuated by a lever, compress the sand. After clamping, the platform revolves and the molds are lowered away from the pattern boards. This machine is sometimes fitted with a pneumatic rammer.

CORES

It must be assumed that the reader of this article is familiar with the requirements of simple core making. Attention is here called to some of the most fundamental of these because in making large and

intricate cores they are even more essential factors in securing satisfactory results in castings than they are in making small and comparatively simple cores.

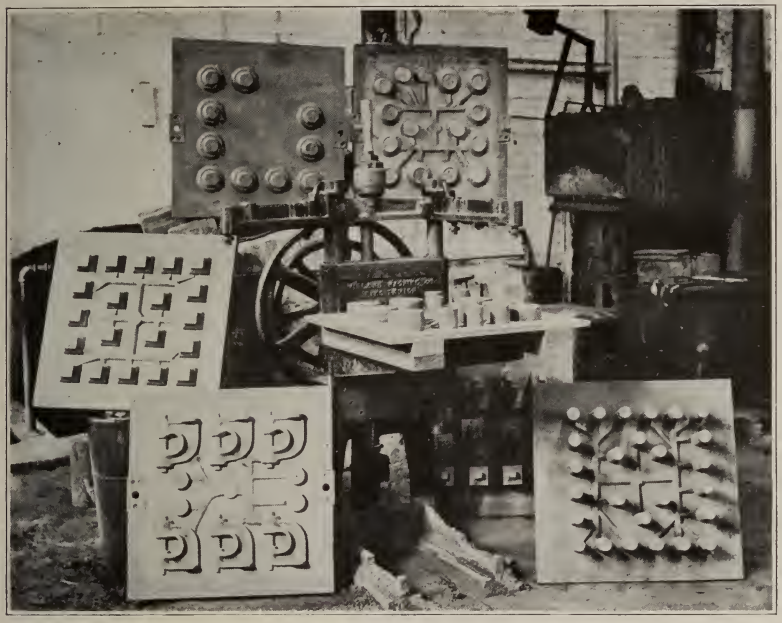


FIG. 19

Core sand must be a naturally free sand refractory enough to withstand the action of molten metal and at the same time porous enough to allow the escape of gases and steam generated by the heat of the molten metal. Usually some organic material possessing binding qualities must be added to the natural sand. Many different binding materials are available, among which is a commercial oil known as core oil. It is usually mixed with the natural sand in proportions of one part oil to from thirty to sixty parts sand. Other binding materials are flour, rosin, linseed oil, glue, and molasses water. Of these flour is one of the best binders, but should be avoided in large cores as it swells with the application of heat and thus increases the size of the core. Binding materials are sometimes supplemented by iron wire, bar iron, gas pipes, etc. These, however, are used to strengthen cores rather than to bind the particles of sand together.

As cores are usually very largely surrounded by molten metal it is necessary to introduce some foreign material to vent those of consider-

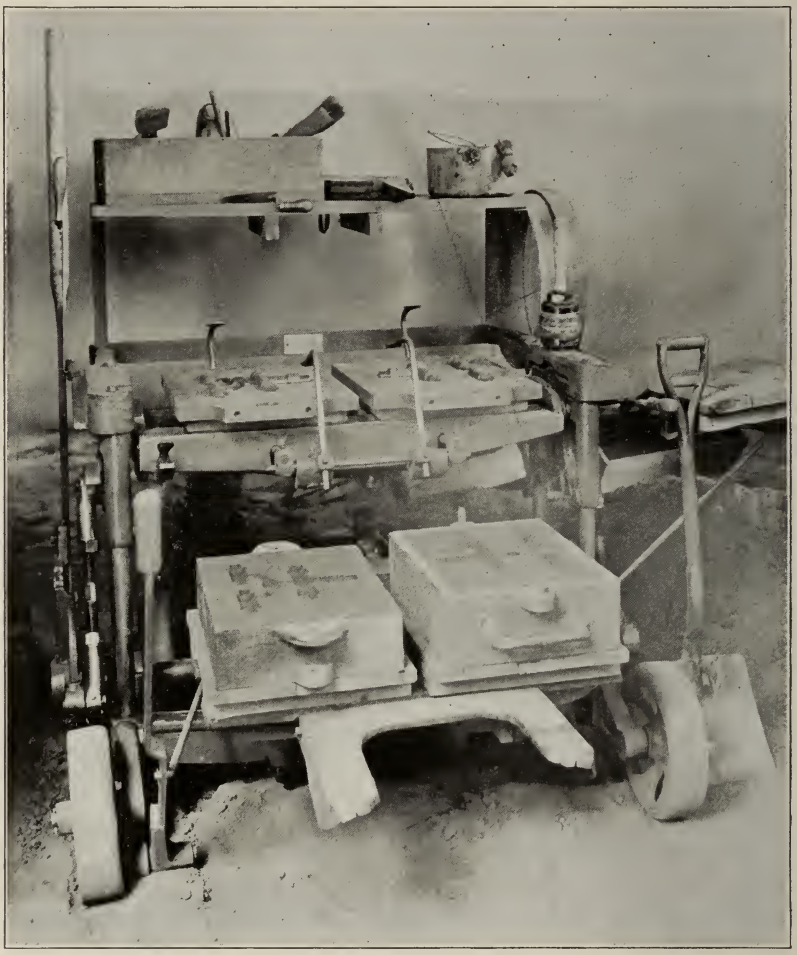


FIG. 20

able size. Cinders are sometimes used. Wax tapers are often inserted. These melt as the core is heated and leave passage ways for the escape of gas. Enough has been said to suggest that in core box construction, as in pattern construction, the pattern-maker must think of the molding process first. He must know, besides other things, how the core is to be removed from the core box, that he may avoid the danger of its

breaking or losing its shape. The following example will suffice to emphasize this:

Core plates should have true planed surfaces, and if the surface of the core which comes in contact with the plate is not in one plane,

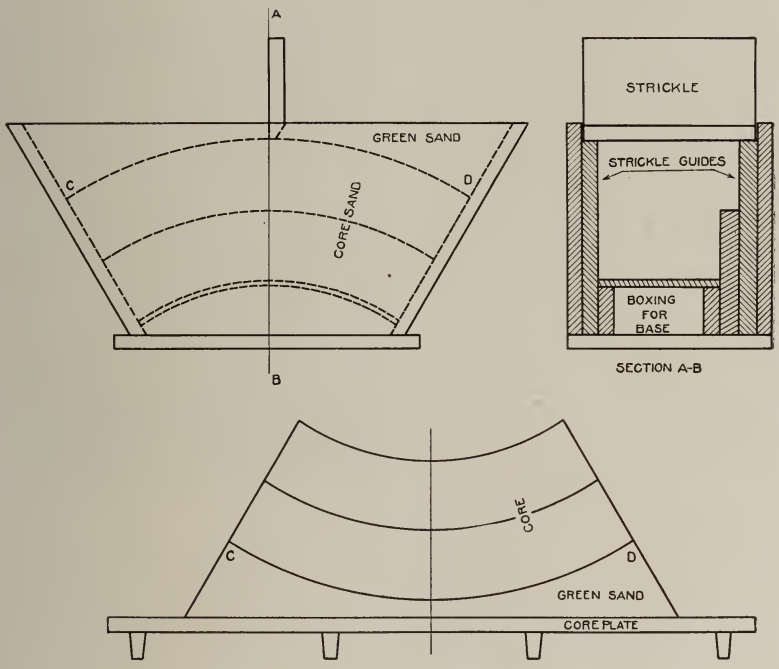


FIG. 21

special provision must be made to prevent the soft core from sagging by nailing around the core box strips of wood, thus forming what is usually termed a "green sand frame." Fig. 21 shows one of the core boxes for the fly wheel mold, which is shown in Fig. 12[1], having a green sand frame around it.

The strickle, worked forward and backward along the guides, is used to level off the core to the proper curvature. It will be seen that if the core is turned out on to a core plate the ends *C* and *D* will sag.

The space above the core sand is filled in with green sand and then the contents of the box is turned out onto the core plate as shown at the bottom of Fig. 12.

[1]See November number.

CHAPLETS

Chaplets are used to maintain a core in position during the casting process if it is not otherwise properly supported in the mold. Chaplets are formed from sheet iron, brass, or copper, according to the class of casting. There are two general types, single headed and double headed. The single headed is similar in shape to a common nail, but has a larger head. The double headed is simply a stem with a head riveted on each end. The stem should be burred so that the metal will grip the chaplets firmly. The "Peerless Perforated Chaplets" are very useful for the smaller class of cores. They are made of perforated, tin plated sheet metal, insuring perfect ventilation of the chaplet, reducing to a minimum the possibilities of blowholes, air pockets etc., and making certain a practically perfect union with the molten metal. Fig. 22 shows an assortment of chaplets manufactured by the S. Obermeyer Co., Chicago, Ill.

FIG. 22

Chaplets weaken a casting in a greater or less degree: *First,* by introducing a foreign metal into the casting which will tend to destroy the uniformity of the metal; *Second,* by the formation of porous spots about the chaplet; and *Third*, by their not fusing properly with the metal. By using chaplets which are tinned or coated with red lead, and by using only those of proper design and size, the evils resulting from their use will be greatly reduced.

HOW TO INSURE UNIFORMITY OF SIZE AND SHAPE IN CASTINGS

Shrinkage, contraction, and warping are conveniently classed and described together because they affect the ultimate size and shape of a casting. Shrinkage and contraction refer to the reduction in size and shape in a casting, while warping refers to the alteration in shape due to unequal contraction. Shrinkage and contraction can be approximately

calculated. It is more difficult to account for warping and, when due to necessary unequal distribution of metal, it is difficult to overcome. If the design cannot be altered so as to have greater uniformity in the

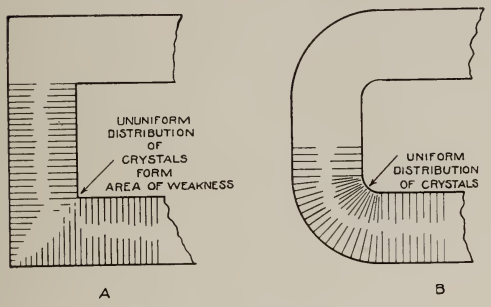


FIG. 23

thickness of metal the remedy for warping must be found either by the pattern-maker or the molder. The following suggest some of the possible remedies:

1. Sometimes the pattern can be made out of true to the extent of the warp, so that in cooling the casting will straighten itself.

2. Long castings poured on the flat tend to lift at the ends, giving a concave surface. If the lift is known the pattern can be made convex to the extent of the lift.

3. If it is known that one part of a casting cools more quickly than another the part which cools last can sometimes be exposed to the atmosphere as soon as practicable after pouring is completed.

4. Chills have been known to be used in the mold to equalize the rate of cooling.

5. Sometimes thin parts have been thickened by means of ribs running the full length of the thin part.

6. Sharp corners should be avoided as they tend to weaken the casting, and are difficult to mold. As the metal solidifies the lines of strength of the crystals form at right angles to the faces of the casting, as shown in *A*, Fig. 23, resulting in a weak corner.

In *B*, Fig. 23, the result of the rounded corner is plainly seen to overcome this unequal crystalization.

All of the patterns and molds used in illustrations for this series of articles including the patterns shown in Figs. 24 and 25, were made by

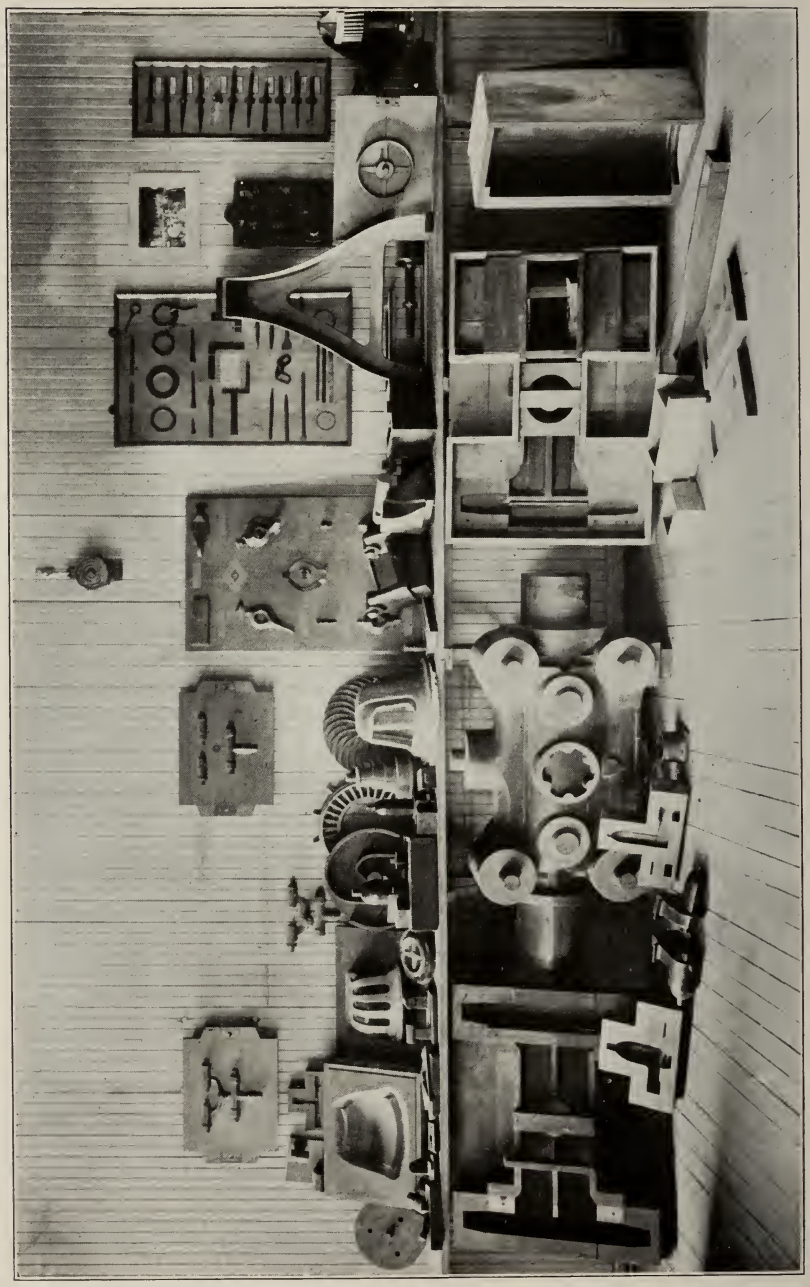


FIG. 24

FIG. 25

students at the University of Wisconsin in regular courses in pattern-making. The patterns shown under the shelf in Fig. 24 are for a steam engine cylinder.

There is practically no limit to which one may go in a treatment of the subject of advanced pattern-making and molding, as practically every problem confronted in these lines of the mechanical trades is a new one, or at least offers some new method of solution. In these articles the attempt has been made to discuss for the reader who is somewhat familiar with the subject the principal types of work and to give specific examples illustrating good commercial practice. It is believed that a more comprehensive understanding of trade conditions and an appreciation of their use under school conditions will be serviceable to teachers.

METALWORK FROM STATE COLLEGE OF WASHINGTON, PULLMAN, WASH.

EDITORIAL

THE RICHMOND MEETING

NO single event of the year is so fraught with vital interest to the industrial education movement as is the annual meeting of the National Society for the Promotion of Industrial Education. The Eighth Annual Convention of the Society, held at Richmond, Virginia, December 9th to 11th, 1914, was no exception to the rule, but rather was the most notable instance of the truth of this statement. Other events may be more potent in shaping ideals, policies, and practices in a particular locality, but this conference is destined to exert a national influence. It was truly national as regards the attendance of delegates and if the same can not be said of the speakers on the program, these speakers at least represented a wider territory than ever before, and the messages which they brought were susceptible of universal application, at least in principle. Of the 56 persons noted in the program, 16 were from the state of New York, 12 from Massachusetts, 7 from Virginia, 5 from the District of Columbia, 4 from Pennsylvania, 3 from Wisconsin, 2 from New Jersey, and one each from Tennessee, West Virginia, North Carolina, Missouri, Indiana, Illinois, and Michigan. Since its organization meeting the Society has frequently been subjected to severe and sometimes to indiscriminate criticisim arising from suspicion regarding the motives inspiring its activities and the sources from which it drew its financial and moral support. In the early days of its history, labor was afraid that the Society was the tool of the employing interests; at one time or another its methods have been called in question by schoolmen because these methods have appeared to ignore or even to oppose the most advanced educational practices in industrial training; social workers have sometimes felt the apparent lack of interest in the problems of child welfare. These suspicions, however, have been gradually dispelled. A recent annual meeting has been referred to as "a boy and girl" convention; certainly the conventions of Cincinnati and Grand Rapids were educational gatherings of the highest order; but it remained for the Richmond meeting to give absolute assurance of the catholicity of the Society's interests. Here were brought together, in nicely balanced proportions, influences from employers' associations, organized labor, child welfare workers, and the schools, both public and

private. In addition to these, two important Bureaus of the Federal Government gave freely of their prestige and their labors.

The Richmond Survey

The discussions of the convention were given largely to the presentation and interpretation of data collected in making the Richmond "Survey." The survey was made in the interests of industrial education and was educational, economic, and social in its nature. It was made under the direction of the National Society which secured and coordinated the efforts of the United States Bureau of Education, the Bureau of Labor Statistics, the Russell Sage Foundation, the local School Board, the Board of Trustees of the Virginia Mechanics Institute, the Central Trades and Labor Council, the Chamber of Commerce, and other local business and social organizations.

The findings of the Committee which reviewed the data collected, and the recommendation based upon the findings can not be discussed here. It should be noted, however, that a remarkable degree of unanimity was secured for the recommendations, apparently because of the absolute logic of the situations as revealed by the facts and as interpreted by experts in the several fields. Furthermore, genuine educational advance is insured under the combined patronage and, in the larger sense, control of school, labor, and the employing interests in the City of Richmond.

But a wider, perhaps a national influence will be exerted by the National Society as the result of this "Survey." It is not that the survey has revealed educational, social, or economic conditions which the student of industrial education did not already appreciate, or has devised methods of dealing with these conditions which have not been in operation elsewhere for some years, but it has accomplished some things of even greater import. It has marshaled its facts in such a way as to convince, not alone students of the question, but *all* the significant factors, that something must be done at once; it has shown these factors just *what* ought to be done and how. Furthermore, it has saved the city from attempting to meet the situation by costly and inappropriate methods, as, for example, the erection of a $225,000 trade school, which had been contemplated seriously.

Charles H. Winslow, of the Bureau of Labor Statistics, and a prominent representative of organized labor, said that labor is now awake to the necessity of carrying forward the inauguration of industrial education. He maintained that industry should say what it wants

and that the schools must learn to give what industry desires. He felt that the value of the survey should be measured by the *enthusiasm* of the people and by the intelligence of the demands which they make upon the schools. Samuel Gompers, President of the American Federation of Labor, affirmed that, for the first time, the problems of industrial education had been thoroly studied from the standpoint of labor, and that the unions would heartily support all of the recommendations which resulted from so adequate a study. To have gained the unqualified approval of organized labor to an inclusive plan of industrial education alone justifies the labor and cost of the survey.

Another important result of the survey is the standardizing of the kind of information which is pertinent to the questions involved in the problems of industrial education. The importance of these facts regarding the school system, the social and economic conditions of the workers, the processes of manufacture, the kind of training needed, the local agencies which should cooperate—the importance of these facts is attested by well nigh unassailable authority.

But, perhaps the most valuable result of the Richmond Survey and the recent convention is the influence which it has had on the National Society and its propaganda. The Society has played a most important part in the campaign which has secured such a rapid growth of industrial education thruout the country. Its influence has been great and, with a few important exceptions, salutary. It has not *claimed* infallibility, but too often its pronouncements have been taken as the final word to be accepted without reservation or modification. That the influence of the Society is to be greatly increased in the future is certain. It is therefore gratifying to note that, with its growing influence, it has grown in wisdom and in breadth of view.

Evidences of Growth

Among the more important evidences of growth are, first, its reversal of its early unsympathetic attitude toward prevocational work which it now heartily endorses and finds absolutely necessary to a complete or adequate solution of the problems involved in democratizing a school system. Second, it seeks to secure the necessary training thru the amplification of the existing school system rather than thru a system of separate industrial schools as at first advocated. Third, they have learned to depend upon the educational authorities for the working out of a part of the problem instead of relying mainly upon the so called "practical man." And finally the Society has come to

recognize that the local conditions must determine to a considerable extent the kind of industrial education needed and the methods of organization and control. At the closing session Mr. Prosser affirmed that vocational education is a "local and not a general question." And so it should be a source of gratification to all friends of the movement that with the enormously increased prestige which comes from having organized so successfully the Richmond Survey, the National Society has taken the broadest possible platform and now stands for the adequate representation and influence of the worker, the employer, and the teacher, and for the proposition that these, working together, ought to be able to ascertain the kind of education which is needed in any given community and to organize the schools in which such education can be successfully given. —F. M. Leavitt.

An Adequate Supply of Teachers

The problem of a supply of suitably prepared teachers for vocational schools continues to be a very pressing one. There is not always a dearth of candidates when a position is to be filled, but the number of teachers having the desired qualifications is certainly not keeping up with the demand. For several years past, educational leaders have been forecasting the inevitable demand, and men and women possessing a suitable foundation for such work have been urged to prepare themselves definitely for service in the new work. We have had attention called to the need practically from the beginning of the vocational education movement. Nevertheless, the number of those who catch the vision of the prospective demand, or who have the courage to act on their conviction, does not appear to be increasing as it should.

The fact that many individuals are thus neglecting opportunities to reach their greatest usefulness is, of course, unfortunate. But the other side of the problem gives perhaps the greater cause for regret and anxiety. The fact that a sufficient number of men and women will not properly qualify themselves for expert service means that some, at least, of the work will be done inefficiently and unintelligently.

An Adequate Period of Preparation

Some of these questions were made the subjects of discussion at an informal meeting of men engaged in the work of preparing teachers of the manual arts and industrial education, representing a number of institutions in the Mississippi Valley. The members of the conference were guests of the University of Chicago for a three-days' session during the third

week of November. In order to call attention to the two chief sources of prospective teachers, and to emphasize the growing opinion that both sorts of preliminary training and experience require special supplementary preparation, the following resolution was proposed for discussion.

Resolved, that the members of this conference believe that promising material for the vocational shop teacher is to be found in the professionally prepared manual training shop teacher who supplements his equipment by not less than one year's experience in the trade; and also in the skilled mechanic who supplements his trade equipment by not less than one year's special professional preparation.

The members of the conference also went on record in approval of the experiments, now under way in numerous places, in providing special professional training for skilled mechanics selected for their obvious fitness for teaching. A note of warning is expressed, however, against the danger of slighting the essentials of the teacher's equipment and attempting to meet the demand by superficial methods.

Resolved, that this conference favors the policy of giving professional preparation for teaching to selected journeymen workers in industry, including such plans as the following: (1) Special institutes; (2) Night school continuation classes; and (3) Full time residence courses; with the provision that, so far as possible, such professional training should extend over a period equivalent to not less than one school year.

The positions suggested by these two resolutions seem to us to indicate a sensible, and at the same time progressive, platform. Formulated as they have been, tentatively at least, by the men who are in the responsible positions of directing the work of preparing teachers, these proposals have weight and influence.

—William T. Bawden.

OF CURRENT INTEREST

EFFORTS TO SECURE LEGISLATION IN ILLINOIS

The state of Illinois is in the midst of another struggle to obtain a law granting state aid for vocational education. At the last session of the legislature two bills were presented, but neither of them passed. The one that came nearest to passing was known as the Cooley bill, because it was drafted under the direction of Edwin G. Cooley, formerly superintendent of schools of Chicago, who was employed by the Commercial Club of Chicago to represent them in an effort to secure a new vocational education law. Mr. Cooley, who had just returned from a study of the German schools, recommended a separate board to administer vocational schools. His bill, therefore, represented the dual system, while the opposition bill represented the unit system. The discussion at that time made it clear that there was almost unanimous opinion in favor of some kind of a law granting state aid for vocational training, but there were many differences of opinion concerning details, and directly opposing views on the system of administration.

During the two years intervening between sessions of the legislature the experiences of other states have been observed, discussion has eliminated some of the confusing elements, and the forces on both sides have been organizing for a battle royal this winter. The teachers, who are almost unanimous in favoring the unit system, have completed their state-wide organization, bringing practically all of the teachers of the state into one great body, which meets once a year as a whole, and at other times in divisions representing the geographical sections of the state, as the southern, eastern, central, western, west-northern, east-northern and Chicago. In the division organizations, which are, in fact, great associations in themselves, and in the conventions of the whole, the subject of vocational training and the needed vocational law has been ably discussed. A committee on legislation representing all the sections has been formed with W. R. Hatfield, of Chicago, as chairman, and a sub-committee on Vocational Education, with Principal W. B. Owen, of Chicago Normal School, as chairman, and D. R. Henry as special investigator. The club women of the state have taken up the discussion, and are quite generally in favor of the unit system.

The Francis W. Parker Club has organized for aggressive work, and the Illinois Federation of Labor has adopted a report of special

significance, favoring the unit system. Meanwhile, Mr. Cooley and those who believe in the dual system have not been idle, and it is reported that many of the legislators have already committed themselves to vote for the dual system.

At this writing neither of the new bills has been published, but it seems to be generally expected that in scope they will be much alike, but they will differ radically on the one issue, the system of administration.

THE ATTITUDE OF THE WOMEN'S LEGISLATIVE CONGRESS

On the 10th, 11th and 12th of December, there was held at the Congress Hotel in Chicago, a convention in the interests of social welfare, known as the Women's Legislative Congress. It was called by Lieutenant Governor O'Hara, president of the senate, who acted as chairman of the Congress. Representative women from all parts of the state were in attendance. The officers of the executive board were Mrs. Harriette Taylor Treadwell, chairman, Mrs. Ida L. M. Fursman and Mrs. Harlan Ward Cooley, vice-chairmen, and Mrs. Helen Hefferon, secretary-treasurer. One of the features of the congress was the address on "The Unit or Dual System of Vocational Education?" by Professor W. C. Bagley, of the University of Illinois. In the discussion which followed Edwin G. Cooley presented the claims of the advocates of the dual system. As a result of the discussion the congress unanimously adopted the following resolutions:

1. All vocational education that is supported by taxation—federal, state or local—should be incorporated in and made an integral part of the present public school system.
2. Vocational work that is specialized in its character, should in the public schools be offered only to those pupils who have attained the age of 14 or who have completed the 8th grade of the elementary schools.
3. No course of study offered in the public schools should be so narrowly vocational in its scope and content as to preclude some work of a liberal type designed to fit the pupils for the broader duties of citizenship.
4. A fair proportion of the cost of public education both general and vocational should be met by state taxation; the funds collected by state taxation for school purposes to be distributed in a way that will in some measure equalize educational opportunities thruout the state.

The congress has raised funds to print 1,000,000 copies of a folder setting forth the principles underlying pending laws approved by the congress.

ARGUMENTS AGAINST THE DUAL SYSTEM

The Francis W. Parker Club, thru its vocational education committee, of which Miss Euphrosyne Langley, of the University of Chicago, is chairman, has issued a circular letter on the unit and dual systems of vocational education which contains the following summary of arguments against the dual system:

1. The great and unnecessary expense in the duplication of plant and equipment.
2. The dual system would leave the public school to the teaching of academic subjects only, thus eliminating industrial training from the education of children not in the vocational schools. But all the progress of recent years has been toward a larger recognition of the fact that no child can be educated without its share of industrial training, and to a consequent introduction of industrial work in the elementary and secondary schools.
3. The dual system is undemocratic. The children of our nation should prepare side by side for their part in our common life. Education should tend to abolish, not to increase, class distinctions.
4. The dual system tends to deprive the child going into the vocational school of the richness and variety of life possible if his vocational work were carried on in the general environment of the public school.

This letter gives the following list of organizations that have endorsed the unit system.

The Educational Committee of the City Club.
The Teachers' Federation.
The Woman's Trade Union League.
The Illinois State Federation of Labor.
The Chicago Woman's Club.
The Woman's City Club.
The Political Equality League.

The letter also gives a list of seventeen speakers who may be secured to present the unit system of vocational education.

PUBLICITY CAMPAIGN

The Illinois Teacher, the official organ of the Illinois State Teacher's Association, gave most of its space in the December number to vocational education. Principles which should govern the proposed legislation were presented by Professor Charles Hughes Johnson, of the Uni-

versity of Illinois. The recent decision of the Missouri State Teacher's Association with reference to legislation on vocational education in that state was included in that number, also reviews of the workings of vocational education laws in Connecticut, Pennsylvania, Indiana, New Jersey, Massachusetts, Wisconsin and the Phillipine Islands.

Many clubs and associations thruout the state are planning to hold public meetings for the discussion of the proposed bill.

THE BUREAU OF EDUCATION CONFERENCE ON TRAINING TEACHERS

The conference on the training of teachers of vocational education, called by Commissioner Claxton and held at Richmond in connection with the convention of the National Society for the Promotion of Industrial Education demonstrated beyond any shadow of doubt that there is a very general interest in the subject thruout the country. The conference was held in connection with a dinner at the Y. M. C. A., on the evening of December 11th, and was much larger in attendance than was anticipated when the conference was called. Dr. William T. Bawden, who had arranged all the details of the conference, acted as chairman. Dr. L. D. Harvey, of Stout Institute, spoke from the standpoint of the institution that trains the teacher, Lewis Gustafson, of the Ranken Trade School, St. Louis, from the standpoint of the school that employs the teacher, and Charles R. Allen, agent of the Board of Education in Massachusetts, from the standpoint of the official who is to inspect the work. These were followed by many others who spoke informally and then the whole discussion was summarized by Charles A. Bennett, of Bradley Institute.

Reduced to its lowest terms the summary was as follows:

1. A man cannot teach what he does not know.

2. A vocational teacher must have had practical experience in the industry he teaches. Not only that, but he must have had the right kind of practical experience. It is quality of experience, not quantity that counts. This experience may be obtained either before or after or while getting pedagogical training, but it must be obtained.

3. A vocational school teacher needs professional training just as much, if not more than any other teacher. This training is essential to give him (a) the proper habit of mind—the right point of view, (b) knowledge of how the human mind works and how habits are formed, (c) the power of pedagogical analysis applied to industrial processes, and ability to organize subject matter into good form for teaching purposes.

4. A vocational school teacher must have a good personality, and this must be based upon good character. Defects in character are no more tolerable in teachers of vocational than of cultural subjects.

The conference recognized the fact that up to the present time it has been impossible to get a sufficient number of properly qualified teachers for vocational school work, but the sentiment seemed to be that this lack should not be allowed to prevent progress in the development of industrial schools. "For the present we must take the best we can find, but keep before us the ideal of the professionally trained, well educated teacher who has had practical experience in the craft he teaches."

PROGRESS IN INDIANA

In Indiana the vocational education bill was made a law by the last legislature to go into effect this September. That much has already been accomplished can be judged from the following extracts from the report of W. F. Book, deputy state superintendent in charge as vocational education:

Vocational departments and schools have been organized at South Bend, Brazil, Anderson, Muncie, Indianapolis, Ft. Wayne and Brookville. Plans are already completed for beginning vocational work in a number of other centers in the next few weeks.

Muncie has started five centers for evening work in home-making. South Bend has organized five centers for home-making and established an all-day school for carpentry, pattern making and printing. Indianapolis has organized vocational departments for printing, machinists, electrical workers, and is making plans for an all-day vocational school. Brookville has established an evening school for home-making and will probably also organize part-time work for the young people in her furniture factory. Ft. Wayne has established an all-day vocational school and is planning for an evening vocational school. Evansville will start an evening vocational school for carpenters, machinists, sheet metal workers, electrical workers and a school for home-making.

Thirty-two county agents of agriculture have been appointed by Purdue university and are giving practical help to the farmers of their respective communities. Z. M. Smith is working under Superintendent Greathouse as supervisor of agricultural education.

It is the idea not to organize more vocational schools than can be properly organized and supervised, and it is hoped to get these established in different types of communities so that other communities in the state may profit by the experiments in vocational education this year.

Before the passing of the above mentioned bill, elementary industrial training had been in the schools of Indiana. Instruction in elementary agriculture, domestic science and industrial arts was given in 196 of the two hundred cities of the state last year.

A SCHOOL THAT BURST ITS SHELL

Because the school board of Red Bluff, Calif., was skeptical of good results, it allowed only $100 for the first year's work of manual training

FIG. 1. THE FIRST BUILDING

in the high school. This was six years ago. Paul G. Ward had charge of this first manual training class, in addition to his regular duties as principal of the school. We quote the story as he tells it in an interesting letter:

I rigged up a shop in the basement and organized a class of six boys. The boys made their own work benches and vises—ordinary carpenters' benches, large enough to accommodate two boys each, and costing $3.00 per bench, vises and all. The remainder of the $100.00 was spent for tools. The class first made some lockers and a dark room for the school. The remainder of the year was spent in making furniture. Three boys made roll-top desks. One boy made a large lunch stand on wheels, an ice chest, etc. Two other boys made mission furniture. We put this work on exhibition at the end of the year. The school board were well pleased, and since then have given me a free hand. The first part of the second year we built a manual training shop 24′x40′. The boys drew up the plans and did all of the work including the cement foundation and the painting. As I had never before built anything larger than a chicken coop, it kept me busy that year consulting carpenters and books in order to keep ahead of the boys. Fig. 1 shows the building as we first built it. It cost less than $800.

We outgrew this building in one year. The next year we cut this building in two, cross-wise, and moved one end out 20 feet, filling in the space between, thus making the building 24′x60′. Fig. 2 shows this elongated building. We also outgrew this building in one year.

FIG. 2. THE ELONGATED BUILDING

FIG. 3. SPLITTING ITS SHELL

The next year, our third year, the class split this elongated building down the center lengthwise and moved one side out 28 feet, filling in the space between the halves with a two story structure, as can be seen in Fig. 3 and Fig 4. We have now a building 52′x60′, and part of it is two stories high. The school boys did all of the work themselves with no assistance save what supervision I gave the work. The entire building cost less than $2,000.00. It contains a roomy blacksmith shop, a woodworking shop, a corner devoted to wood-turning, a wood room and a paint room. The building is now accommodating some fifty or more boys engaged in the various manual training departments. The building is

equipped with home-made benches and lockers. One interesting feature of the woodworking department has been the making of boats for use on the river near by. Many of the boys have made for themselves very creditable boats. The shop is open to any of the school boys whether they belong to the manual training classes or not. It is open all day long including Saturdays. I suppose had it not been for my early religious training, it would have been thrown open Sundays also, for I was visited by a delegation of the boys with a request to permit Sunday work. We now employ a first class manual training teacher who puts in his full time in the shop.

FIG. 4. THE NEARLY COMPLETED BUILDING

SHOP NOTES AND PROBLEMS

ALBERT F. SIEPERT, Editor

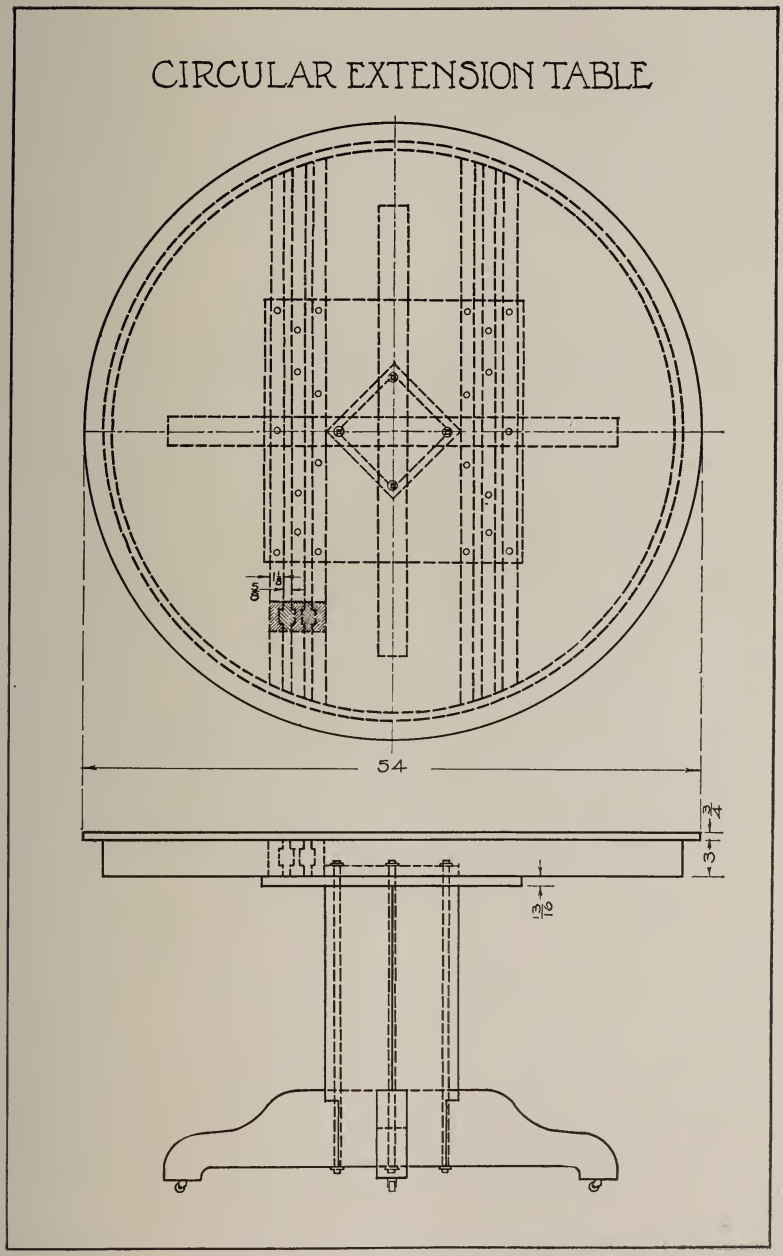
CIRCULAR EXTENSION TABLE

The feet of this table are made of two pieces of 3″ oak and halved together at the center, making them stronger than if there were four separate feet. The centerpost is made of four pieces of oak 8″ in width, the corners being splined joints; the lower end of the centerpost is cut away so as to fit into "V" shaped notches 1″ deep where it crosses the tops of the feet. A false top with a reinforcing piece between the slides is fastened to the centerpost by four bolts running down thru the inside of the post and thru the feet. The head of the

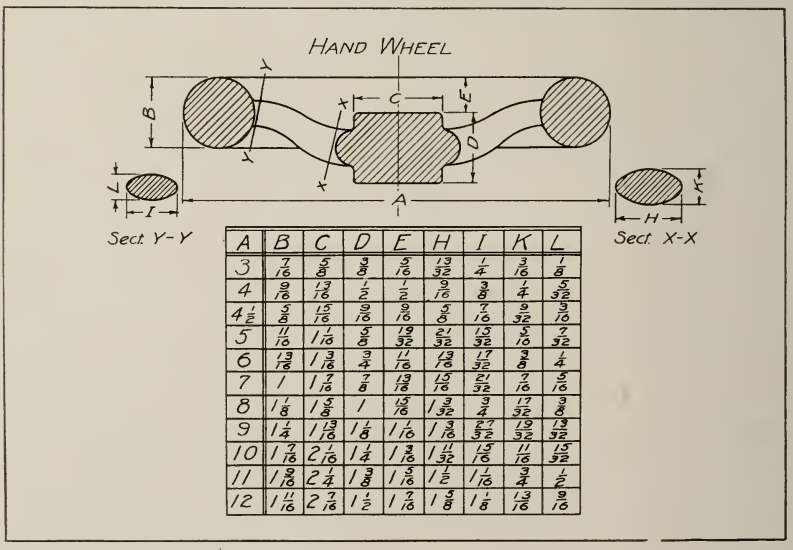
bolts are placed on the under side of the feet, while the nuts and washers are placed on the upper side of the reinforcing piece. Any desired degree of rigidity may be secured by drawing the bolts up tight.

The slides are made of 1⅛″x3″ material. The middle and two outer members of each slide are bolted to the false top with ¼″ stove bolts. The second member from the outside is screwed to the one half of the table top while the fourth member is similarly fastened to the other. These slides are made by machine, the grooves in the middle and two outer members being made on the circular saw while the other two are cut to fit on the jointer, using it as a rabbeter.

The rim underneath the top is glued up of seven ⅛″x3″ oak strips. A semicircle of the proper diameter is drawn on the floor and a form built around it by nailing cleats on both sides, leaving a 1″ space between the rows. The strips of oak are laid together with glue between them and bent to fit the form which will hold them in place, tho hand clamps must be used to bring the pieces


CIRCULAR EXTENSION TABLE
54
3/4
3
13/16

in proper contact. After the glue has set, this half rim is taken from the form and the other half made. When properly finished these half rims are fastened to each half of the top with corner irons and to the ends of the slides with which they come in contact, care being taken that each half is fastened to its own slides. The top is made in two parts and of selected material. The table measures 54″ in diameter and extends to 98″ in length, altho the extension could be greater, as it is necessary to pull out either side 43″ before it can be removed from the slides. —Leroy P. Elliott, Perth Amboy, N. J.



A	B	C	D	E	H	I	K	L
3	7/16	5/8	3/8	5/16	13/32	1/4	3/16	1/8
4	9/16	13/16	1/2	1/2	9/16	3/8	1/4	5/32
4 1/2	3/8	15/16	9/16	9/16	5/8	7/16	9/32	3/16
5	11/16	1 1/16	5/8	19/32	21/32	15/32	5/16	7/32
6	13/16	1 3/16	3/4	11/16	13/16	17/32	3/8	1/4
7	1	1 7/16	7/8	13/16	15/16	21/32	7/16	5/16
8	1 1/8	1 5/8	1	15/16	1 3/32	3/4	17/32	3/8
9	1 1/4	1 13/16	1 1/8	1 1/16	1 3/16	27/32	19/32	13/32
10	1 7/16	2 1/16	1 1/4	1 3/16	1 11/32	15/16	11/16	15/32
11	1 9/16	2 1/4	1 3/8	1 5/16	1 1/2	1 1/16	3/4	1/2
12	1 11/16	2 7/16	1 1/2	1 7/16	1 5/8	1 1/8	13/16	9/16

HAND WHEELS

The drawing of a handwheel with its accompanying table of dimensions represents the average proportions of a number of handwheels of different sizes that have had years of successful use. The dimensions were obtained by a graphic process of averaging, the data being taken from standard handbooks.

The handwheel is a good project for teaching modeling and whittling in the pattern shop, and by the use of the above table may be made in a variety of sizes. This gives each student the same principles and methods while suiting his ability, by giving the smallest dimensions to the most skillful and the medium dimensions to those less so.

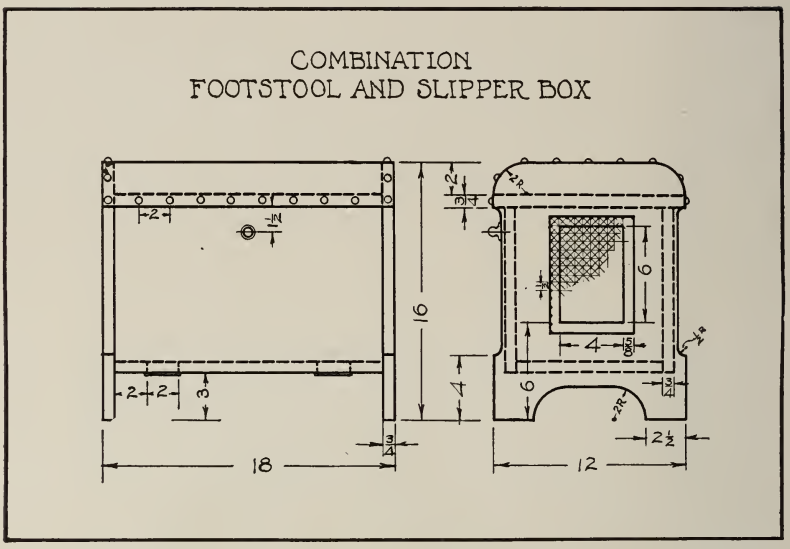
—F. H. Evans and E. A. Johnson, Bradley Institute.

COMBINATION FOOTSTOOL AND SLIPPER BOX

Of the making of footstools in the manual training shops there is no end, but as the type here given takes in so many different kinds of work, it is worthy of notice. This model has been used very successfully as a required problem in the eighth grades of the St. Paul Public Schools.

Each boy pays for the materials used in the footstool, except the cane, screws, stain, and varnish, which are furnished by the board of education. The total cost, of course, varies with the qualtiy of materials used, but in most cases it is about $1.65, the different items being about as follows:

Selected oak or birch	$ .70
2 lbs. sea moss	.30
Leatherette	.25
Gimp	.10



4 oz. upholstering nails	.05
2 in. brass hinges	.10
Cupboard catch	.05
Hollow or solid brass knob	.10
1 foot brass chain	.02

After cutting the different pieces to size and shape, the boy is ready to cut out the squares for caning. In doing this he should rabbet around the sides of the square with a chisel to a width of ⅝″ and depth of ⅛″ on one side of the piece. Tangent to the edges of the rabbetting, holes are bored ½″ apart all the way around with a 7/32″ bit. Caning is so easy to teach that instructors find it convenient to give the demonstration and allow the boy to take his work home to cane.

In the accompanying drawing the footstool is shown as opening on the side. It may be as easily arranged to have the top lift up. It is also shown as put together with blue round head screws. Flat head screws can be counterbored in and the holes plugged smooth, or with plugs fashioned for button effect. Instead of the plain butt joint the housed joint can be used to good advantage in setting the stool together.

Different colors of stains and several kinds of finishes give variety as well as instruction to the boys. In upholstering, the boy may have to pack the sea moss in his canvas two or three times before he has a neat enough job to put on the leatherette. A light, brass chain, perhaps a foot long, and known to trade as safety chain, may be used to keep the door from striking against the floor if the door opens on the side. Now and then a boy who is especially skillful may inlay a star, some original design, or fraternal insignia on the door of his

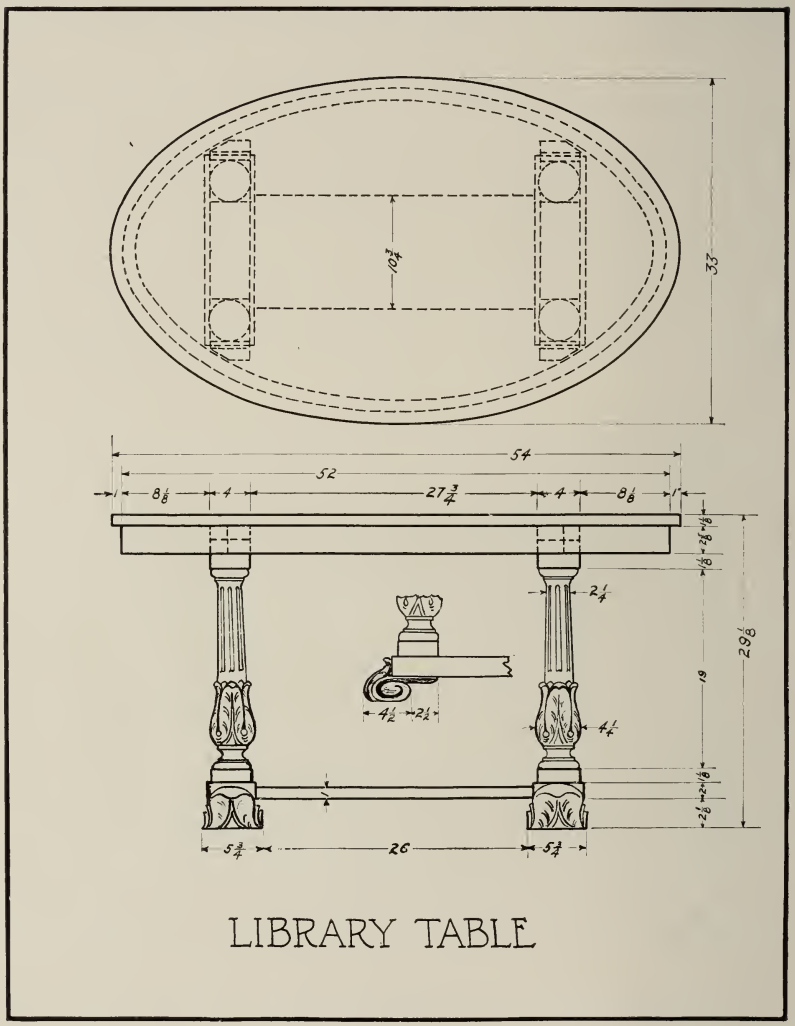
footstool. Care should be taken not to make the same larger than 2″ square. Genuine leather can be used instead of the leatherette, altho the latter serves the purpose of education and utility quite as well.

To complete the footstool requires a whole semester, with one period of two hours per week. In its making about twenty different tools are used, nearly as many as there are in the average shop, so that the problem affords a splendid review and not a little headwork in the use of tools. In this problem are embodied woodworking, caning, finishing, upholstering, and buying. To the instructor the possibilities of much variety without altering the general design of the footstool are soon apparent. Finally, when the work is finished, the boy has something which could hardly be bought at the stores for less than $8 to $12, if at all, something handy in which to keep his shoes and slippers, something which will always impress him and his parents with the practical side of manual training. —S. S. TINGLE, St. Paul, Minn.

LIBRARY TABLE

The library table shown in the accompanying photograph and drawing was contributed by H. A. Hutchins, assistant principal of the East Technical High School, Cleveland, O., and represents a type of work done in that school by pupils taking vocational training in the cabinet making department.

The table is made of quarter-sawed oak, and in addition to the usual features of construction, includes veneering and carving. The rail under the top is built up of segments of chestnut, band sawed to form. Oak veneering is then glued on the outer surface. The legs and feet are hand carved, the design first being sketched to full size and then worked in the wood.

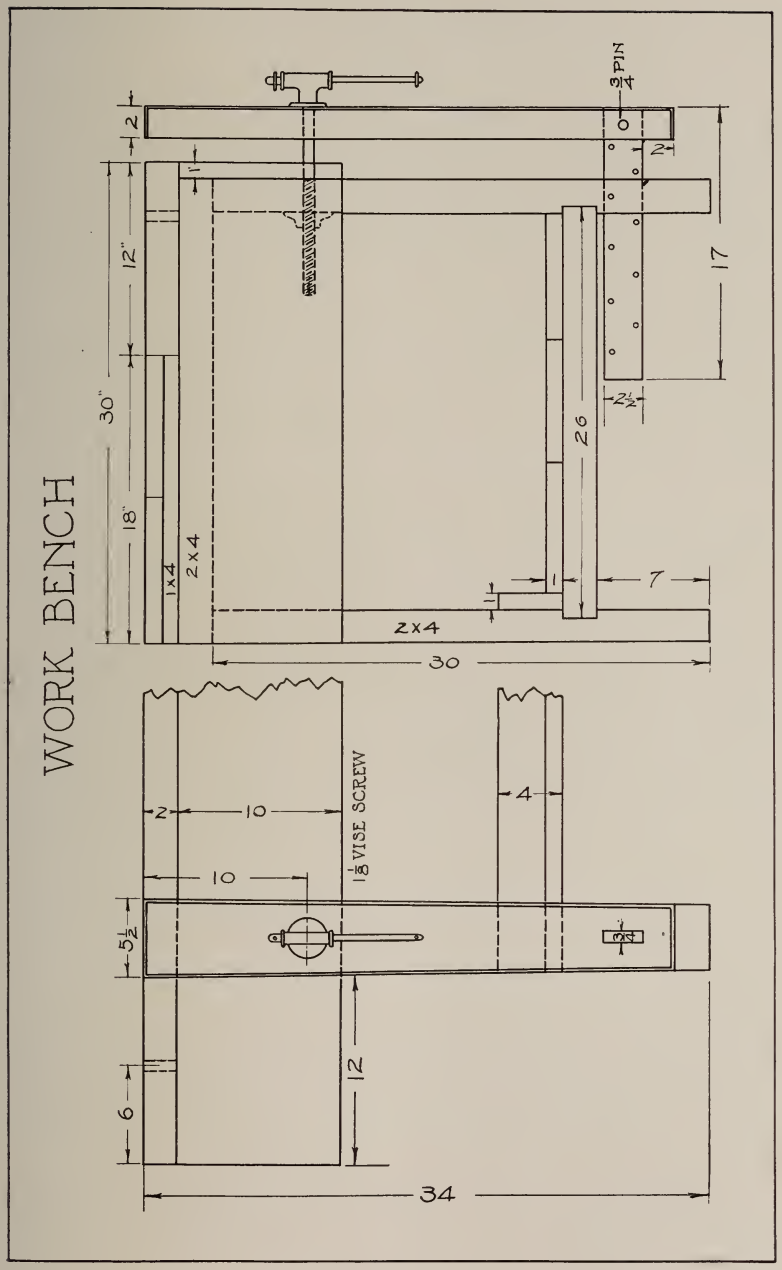


LIBRARY TABLE

WORK BENCH

The work bench is suitable as a short course project, and makes a good addition to the farm shop. The length is determined by the size of the shop or the space which can be allowed for it. It may be made of hard pine thruout, with the exception of the vise jaw, which should be of hard wood.

H. E. Peek, McIntosh, Minn.


WORK BENCH
2
12"
30"
18"
1x4
2x4
3/4 PIN
17
26
7
2x4
30
1 1/8 VISE SCREW
2
10
10
4
5 1/2
12
6
34

REVIEWS

Vocational Arithmetic. By H. D. Vincent; published by Houghton Mifflin Co., Boston, 1914; 5⅜x8 in., 124 pages; price 55 cents net.

This is a book of 100 lessons, each lesson bearing on some one vocation. Among the titles of the lessons are: carriage painting, the doctor, the Chinese laundry, hog raising, church financing, automobile overhauling, and 94 others as common. Each lesson contains: questions to arouse interest and get the pupils to talk on the subject—at least one question pertaining to commercial geography, a problem in arithmetic typical of the vocation, words of the vocation for spelling and defining or using in sentences, and business exercises such as writing letters, bills and receipts connected with the business. One page is devoted to each lesson. In the back of the book are specimens of letter writing and business forms.

The book contains no rules nor long lists of problems for drill work, and is not organized with reference to arithmetic principles, altho, in general, the problems increase in difficulty and complexity.

This book is strictly practical in every sense of the word and should find a ready reception by every vocational teacher looking for a text that is sure to arouse interest.—F. H. Evans.

Report of the Canadian Royal Commission on Industrial Training and Technical Education, Vols. I to IV. Printed by order of Parliment, Ottawa, Canada, 1913.

This is the report of the commission of which Dr. James W. Robertson of Montreal was chairman. It is the result of a very extended tour thru Europe and America and is the most complete and valuable of all the numerous reports on industrial education that have appeared in recent years. A feature of this report is the large number of individual statesements of fact and opinion by men who are in positions of responsibility in the several types of schools investigated. These statements and the details of courses and organization add to its value. Part I contains the "principal opinions" and the recommendations of the Commission. Part II deals with elementary and secondary education in relation to industrial training, and relation of industrial training to vocational problems, to the needs, duties and rights of individuals, and to apprentices, foreman and leaders. It includes vocational guidance, compulsory attendance, etc., etc. Part III, which covers two volumes, treats the subject by countries and cities, the British Isles, Germany and the United States being given the most attention. Part IV, one large volume, is devoted to the inquiry in Canada.

Laundry Work in Theory and Practice by E. L. Marsh. Published by Longmans, Green and Co., New York, 1914; illustrated; 5x7 in.; 202 pages; price 75 cents.

The book is written primarily for young women in training to become teachers, and as a help in teaching. There are minute directions not only for laundry work in the usual sense, but for all forms of cleaning of apparel, such as bran washing, paraffin washing, the cleaning of straw hats and the cleaning and preserving of furs.

Experiments. By Phillip E. Edelman, published by the author, Minneapolis, Minn.; 5x8 in; 250 pages; cloth bound $1.50, leather bound $3.00.

Book I consists of graded experiments in physics, chemistry, electricity, wireless communications and mechanics. Book II treats of principles of original experimenting in science, invention and the industries. The work is illustrated.

English Synonyms and Antonyms. By James C. Fernald. Published by Funk and Wagnalls Co., New York, 1914. 7¾x5¼ in.; 708 pages; price $1.50 net.

This book contains over 8,000 classified and discriminated synonyms with nearly 4,000 classified antonyms together with the correct use of prepositions indicated by illustrative examples, and practical hints and helps on the accurate use of words.

Simple Garments for Infants. By M. B. Synge, London. Published by Longmans Green & Co., New York, 1914; 6½x8½ in.; 48 pages.

This consists of paper patterns for 52 garments.

The Sewing Book. By Annie L. Jessup, director of sewing, New York City public schools. Published by The Butterick Publishing Co., New York, 6x9 in.; 120 pages; price, 60 cents by mail.

This book is the result of many years of experience in superintending the teaching of sewing in public schools, and the author has aimed to give material which will help teachers to develop the thought content in each lesson. It contains complete instructions for sewing and simple garment making for children in primary and grammar grades.

The Graphic Drawing Books. Published by The Prang Company. Each book is 10½x8 in., and contains 40 pages; price 15 cents each for the first four books and 20 cents each for the second four.

A prominent feature of this series of books is the plan adopted for the teaching of color. It is based on the pigment colors, not on the prismatic colors. The books contain much of the same kind of material that is found in other Prang books on art education, but in each there is something new.

A Study of Foods by Ruth A. Wardall, head of Department of Home Economics, State University of Iowa, and Edna Noble White, head of Department of Home Economics, Ohio State University. Published by Ginn and Company, New York, 1914; 5x8 in., 169 pages; price 70 cents.

The book is not divided into sepaarte lessons for it aims to give the subject matter alone. The emphasis is not only placed on the nutrition of foods but also on their cost. The common foods are graphically compared in the illustrations as to their varying amounts of fat, carbohydrates, protien and

chalories. The last twenty-five pages contain nothing but the reproductions of photographs of meat cuts made by L. D. Hall of the Illinois Agricultural Experiment Station.

The Elements of Descriptive Geometry. By Harold C. Bird; published by Harold C. Bird, Chester, Pa., 1914; 5¼x7½ in., 53 pages.

This is a clear and very concise presentation of the fundamental principals of descriptive geometry, dealing with the point, the line, and the plane. Contrary to common practice, this book does not include intersections and developments of solids, or drawing exercises. All of the plates are in the back of the book on folded sheets. This leaves the printed matter unbroken by cuts, as all of the illustrations are on the plates. The plates will fold entirely outside of the covers in a position very convenient for reference. The cover is flexible and the print clear and attractive.

This is an excellent text for a course where the instructor plans the exercises and outside work and desires to place an attractive, comprehensive, yet condensed, text of fundamentals in the hands of his students.—F. H. Evans.

RECEIVED

Manual Training in Village and Rural Schools. By George E. Bray, State Agricultural College, Manhattan, Kansas. A bulletin published by the College. This is the most suggestive treatment of the subject that has come to our attention.

Shop Apprenticeship System for Boys. Information concerning the system in vogue at the works of the General Electric Co. at Schenectady, N. Y Gives statement of courses of instruction and illustrations of boys at work in the shops.

School Lessons on Corn, Farmers' Bulletin No. 617. Published by the United States Department of Agriculture. This contains outlines of 12 lessons covering such important points as the different kinds of corn, ways of judging corn, seed corn, crop rotation, best kind of fertilizers, proper cultivation, and the food value of the crop.

The School of Apprentices. The Lakeside Press, Chicago. A descriptive, illustrated circular of this efficient school of printing.

Facts About the Public Schools of New Orleans in Relation to Vocation. By David Spence Hill. This fifty-eight page pamphlet is the first of several studies bearing upon the establishment of the Isaac Delgado Central Trades school. It is published by the Commission Council.

The Apprentice School System of the Southern Pacific Company. By Thomas G. Gray. Published in the *University of Nevada Bulletin*, January, 1914.

MANUAL TRAINING AND VOCATIONAL EDUCATION

MARCH, 1915

A POLICY OF INDUSTRIAL EDUCATION[1]

JOHN DEWEY

THE habitual American attitude towards public education is, to say the least, paradoxical. Belief in publicly supported education is the most vital article of the average citizen's creed. Money devoted to educational purposes makes the largest item in the budget, and payment of taxes for school purposes is accompanied with the least amount of grumbling. The man who ridicules his legislature, who is suspicious of his judiciary, and openly flouts his police system, is enthusiastic about public education. But the connection of the public with its schools ends for the most part with their support. There is next to no provision for public control, and that little is generally felt to be a nuisance when it extends its activities beyond the financial support of the schools under its nominal charge. The direction of educational policy is no part of statesmanship; the divorce of school from politics—which presumably means matters of public policy—is thought to represent the ideal state of things. Educators have reciprocated by taking an astonishingly slight interest in the public functions attached to their own work. Social settlements, amateur philanthropists, and voluntary associations, rather than professional educators, have agitated the questions of child labor and juvenile crime, of adequate recreative facilities and the wider use of the school plant, and even of preparation for making a livelihood.

That our *laissez passer* methods have worked as well as they have indicates a certain soundness in our social life, as well as at least a temporary adaptation to our needs. That these methods will work as well in the future may be doubted. The formation by Congress of a Commission on National Aid to Vocational Education, composed of two senators, two representatives, and five laymen, reflects both the tradi-

[1]This article first appeared in *The New Republic,* Dec. 19, 1914. It is reprinted with the permission of the Republic Publishing Co.—Ed.

tional system and the feeling of need for its change. Not one of the five lay members is a professional educator. While the Commission recommends the giving of aid, and drafts a bill which would involve an initial annual grant to the states of a million and a half dollars, rising to the sum of seven millions thru a period of years, there is no thot of provision for a minister of education. The Federal Board in control is to consist of the Postmaster-General, with the Secretaries of the Interior, of Agriculture, of Commerce and Labor. The Commissioner of Education is to remain an executive clerk altho with somewhat enlarged clerical duties. The proposal is characteristic of our tradition. We are far from the day when direction and supervision of publicly supported education will be a public function.

FURTHER STUDY SHOULD PRECEDE LEGISLATION

Meantime the existence of an official Federal Commission is evidence of the changing situation. Congress is hardly likely to pass the bill which is recommended. Legislative action is of doubtful value till the subject of industrial education has been more thoroly discussed. It is more important that it be treated as part of a general statesmanlike policy toward education than that immediate isolated steps be taken for furthering the agricultural and trade instruction of youth over fourteen. There is as yet no public opinion as to the standpoint from which education for industry should be approached, or the aims which should control the undertaking. The reasons thus far advanced for making industrial training an organic part of public school education are an undigested medley. The need of a substitute for the disappearing apprenticeship system, the demand of employers for more skilled workers, the importance of special training if the United States is to hold its own in international competitive commerce, figure side by side with the educational need of making instruction more "vital" to pupils.

The oft-cited experience of Germany as to the importance of industrial education must be weighed in connection with the purpose which has dominated her efforts. This has been frankly nationalistic. The available statistics indicate that the effect of industrial education upon wages has been almost negligible, skilled workers receiving but little more than unskilled. But the effect of industrial education upon the workers individual wage or happiness was not the animating motive. Germans claim with justice that their systematized and persistent ap-

plications of intelligence to military affairs, public education, civil administration, and trade and commerce, have a common root and a converging aim. The wellbeing of the state as a moral entity is supreme. The promotion of commerce against international competitors is one of the chief means of fostering the state. Industrial training is a means to this means, and one made peculiarly necessary by Germany's natural disadvantages.

One does not need to grudge admiration for the skill and success with which this policy has been pursued. But as a policy it is extraordinarily irrelevant to American conditions. We have neither the historic background nor the practical outlook which make it significant. There is grave danger that holding up as a model the educational methods by which Germany has made its policy effective will serve as a cloak, conscious or unconscious, for measures calculated to promote the interests of the employing class. It is the privilege of large employers of labor to supplement public schooling by classes which they themselves support, in order to give the special knowledge and skill required in their operations. There are many interesting and successful attempts of this kind. It is natural that employers should be desirous of shifting the burden of this preparation to the public tax-levy. There is every reason why the community should not permit them to do so. Class against class, there is no reason why the community should be more interested in the laboring class than in the employing class, save the important reason that the former constitutes a larger part of itself. But every ground of public policy protests against any use of the public school system which takes for granted the perpetuity of the existing industrial regime, and whose inevitable effect is to perpetuate it, with all its antagonisms of employer and employed, producer and consumer.

AIMS OF INDUSTRIAL EDUCATION

In the lack of inlightened public opinion as to the place of industrial training in the public schools in a would-be democracy, even the enumeration of commonplaces may be of some help; unfortunately they are not as yet current commonplaces. In the first place, its aim must be first of all to keep youth under educative influences for a longer time. Were it not for historic causes which explain the fact, it would be a disgrace that a large proportion of the school population leaves school at the end of the fifth or sixth grade. Irrespective of its causes, the continuance of

this situation is a menace. Meager as are the efforts already put forth in adapting industry to educational ends, it is demonstrated in Chicago, Gary, and Cincinnati, that such adaptation is the first need for holding pupils in school and making their instruction significant to them. In these places the aim has not been to turn schools into preliminary factories supported at public expense, but to borrow from shops the resources and motives which make teaching more effective and wider in reach.

In the second place, the aim must be efficiency of industrial intelligence, rather than technical trade efficiency. Schemes for industrial education thus far propounded ignore with astonishing unanimity many of the chief features of the present situation. The main problem is not that of providing skilled workers in the superior crafts. Taken by itself, this is a comparatively simple problem. But it cannot be taken by itself, for the reason that these crafts are the ones already best organized and most jealous of efforts to recruit their numbers beyond the market demand, and for the reason also that automatic machinery is constantly invading the province of specially trained skill of hand and eye. Wherever automatic machines develop, high specialization of work follows. In the larger cities even the building trades now represent a grouping of a very large number of separate occupations, demanding for the most part simply skill in managing machines. The automobile is a complicated machine, nevertheless ninety-five per cent of the labor of manufacture in the cheaper cars is unskilled. Such facts are typical. The rapid change by means of new inventions of the forms of machine industry is another controlling consideration. The mobility of the laboring population in passing from one mode of machine work to another is important. Such facts cry aloud against any trade-training which is not an integral part of a more general plan of industrial education. They speak for the necessity of an education whose chief purpose is to develop initiative and personal resources of intelligence. The same forces which have broken down the apprenticeship system render futile a scholastic imitation of it. In view of the determined effort of the Indiana plan to limit financial aid to schools in which wage earners are confined to the branch of industry in which they are already engaged, the following provision in the proposed federal law is particularly suspicious. In the case of evening schools, federal aid is restricted to schools which "confine instruction to that which is supplemental to the daily employment."

In a word, the problem in this country is primarily an educational one, and not a business and technical one as in Germany. It is nothing

less than the problem of the reorganization of the public school to meet the changed conditions due to the industrial revolution. In view of this consideration, the absence of all educators from the Commission on National Aid to Vocational Education has a peculiar significance. Professional educators are not free from blame, because of their indisposition to face the question of educational reorganization. But to leave educators out of the discussion of an educational problem is a curious proceeding. They will have to take a large share in the execution of any plan which may be adopted. If they cannot be trusted to have a responsible share in the making of the plan, the chances of their execution of it are indeed slight. The situation also adds peculiar significance to the fact that the Commissioner of Education is made by the bill an executive clerk of various departments of the Government which have direct concern with certain forms of industry but none with education. It is not an immediately important question whether there be a minister of education in the Cabinet. It is a fundamentally important question whether or no a Federal policy with respect to industrial education be initiated which relegates the educational interest to the background.

INDUSTRIAL TRAINING MUST BE THOUGHT OF FIRST OF ALL AS CULTURAL, A FORM OF DISCIPLINE NECESSARY FOR EVERY BOY OR GIRL WHOM WE MAY EXPECT TO LIVE WISELY AND MAGNANIMOUSLY. IT IS A VICIOUS THEORY THAT ONLY THOSE WHO ARE TO BE COMPELLED TO WORK WITH THEIR HANDS SHOULD BE EDUCATED INDUSTRIALLY.—William A McKeever.

THE VOCATIONAL EDUCATION ASSOCIATION OF THE MIDDLE WEST

Charles A. Bennett

IF sustained interest, live speeches, pointed discussions and audiences averaging over 600 people can make a successful educational meeting, then the first annual convention of the Vocational Education Association of the Middle West was a decided success. We do not recall a convention of four sessions bringing together so many people where from beginning to end there was such close attention to all the speakers, where good points were so heartily applauded, where each speaker seemed to feel that he had a vital message, and was appreciated accordingly, even by those who could not agree with his point of view, as was true of this convention held at the LaSalle Hotel, Chicago, on February fifth and sixth. The reason for all this is clearly due to the fact that there was one major theme running thru all the sessions and this theme was regarded by all as being of great importance. Altho the topics of the several sessions were "Vocational Experience of Other States," "Proposed Legislation," and "Child Welfare," the real theme was "The Unit versus the Dual System of Administration of Vocational Education." The president, William J. Bogan, principal of the Lane Technical High School, who made the program, deserves credit for having acted at the psychological moment in selecting his theme, and then for procuring speakers who treated it from almost every possible angle. The only regret in this regard was the failure of Dr. Edwin G. Cooley to take his part on the program. His excuse was that after receiving the announcement of the meeting and talking the matter over with his associates he had concluded that he did not care to appear on the program. His side of the question, however, was ably represented by George Landis Wilson, of the Chicago Association of Commerce, who spoke with great frankness and good spirit to an audience that was clearly on the other side of the question, tho their applause showed their appreciation of his presentation.

In such a convention, which was essentially a continuous debate, it is to be expected that some rather weak contributions would be made and this was true on both sides. At a few points, too, there were efforts to omit or obscure certain facts and, of course, to allow opinions to take

the place of facts, but on the whole the points were met squarely and the result was certainly a larger view of the whole question, and its relation to other social and economic problems.

VOCATIONAL EXPERIENCES

In the afternoon session on Friday John A. Lapp spoke for Indiana, G. L. Sprague and Wilson H. Henderson for Wisconsin, and Arthur D. Dean for New York. Mr. Lapp pronounced the Indiana law a success, tho he admitted that it had not been on trial long enough to prove its effectiveness. He said that already 4,000 pupils are doing vocational work in the schools of Indiana—most of them in evening classes. He believes that all-day trade schools are not likely to meet the needs, that part-time schools will help a little, but the greatest good will come from continuation schools. But he sounded a note of warning when he said that we must not by establishing merely continuation schools drive boys out of the regular day schools in order to get vocational training.

Mr. Sprague was enthusiastic over the working of Wisconsin's law. He stated that it was especially designed to meet Wisconsin's peculiar needs. He did not seem to look upon the Wisconsin system as a dual system. He said "Wisconsin really has an associate board." Much of the work is done in the public school buildings. He stated that the local superintendent now has more power than before, because he is a member of the industrial, or associate board, but not of the older school board. He affirmed that the system is working without competition, and without rivalry. This year there are 25,000 pupils in schools working under the new law.

Mr. Henderson stated that the success in Wisconsin was due to the fact that the salaries have been from $1,400 to $1,800 a year in such schools. He seemed to place less value on the continuation school than did Mr. Lapp. He regarded it as merely palliative in its effect. He would have more vocational training in the public high schools. He would utilize manual training equipments in high schools. Such equipments in the better high schools are essentially what are needed in vocational schools, and he would not duplicate these until used to full capacity.

The climax of interest during the afternoon was reached in the address by Mr. Dean. He first emphasized the importance of a state

board of education. No matter how wise and efficient the commissioner of education or the state suerintendent may be, his action should be subject to the advice and control of a board of education which should stand between him and the public. No great corporation would be run on any other plan. Mr. Dean advises the State of Illinois to make its law very simple, and its carrying into effect subject to a board of education which would be in control of all public school funds. It is easy for the board to change its rules and regulations to meet changing needs, but it is difficult to change laws as often as new needs arise.

Mr. Dean thinks it is easy to overestimate the value of local advisory boards. Men are too busy to give the kind of help that is needed. "You can get economic advice but not technical advice." He stated the agricultural schools of New York have just been placed under the Division of Vocational Education, which act removes the last vestage of a dual system in that state.

THE IMPORTANCE OF UNITY IN THE SCHOOL SYSTEM

Four hundred and fifty people were present at the banquet on Friday evening. After the address of welcome, the speakers were Charles H. Winslow, of the Bureau of Labor Statistics, Washington, D. C.; W. L. Olander, chairman of vocational education committee of the Illinois Federation of Labor, Chicago; George Landis Wilson, of the Chicago Association of Commerce; Mrs. Ella Flagg Young, superintendent of schools, Chicago; and Dr. Frederick W. Roman, professor of economics, Syracuse University.

Mr. Winslow's address was a plea for collecting facts before establishing new kinds of vocational school work. There should be close relationship between the shops and the schools. The schools ought to study the industries to find out what occupations should be taught in the schools. The schools in each community should be as unique as the industries of that community.

Mr. Olander gave an especially effective address. One of his first declarations was that the vocational education now in the public schools of Illinois should be allowed to remain. There is no sound reason for the separation of the two types of education. Opposition to the present unity comes only from one class of society—the commercial and manufacturing. "Is this effort to separate education an effort to remove from vocational education the influence of the schoolmaster? What is

the matter with the schoolmaster? We have our criticism of the schoolmaster, but we are willing to let him go on. We have the power of public criticism, and that is all the power we want."

Again Mr. Olander asked and answered his own question: "Why do we give vocational education at all in the schools? First, because vocational courses are a necessity in a broad education; second, to give skill needed by the world's workers." We do not intend that the school door shall be locked on any of our children. They must have a chance to hitch their wagon to a star. Let the men say to the public school, "Go on and develop vocational training. Let us have more skill."

Mr. Wilson took Mr. Cooley's place on the program and presented what one of his hearers termed "a defense of the motive" behind the Cooley bill. He approved a state board of education appointed by the governor, and an industrial board similar to the one in Wisconsin. He said there was no limit to the kinds of vocational education that might come under the Cooley bill. "Our ideal is not to get vocational education for the least sum of money, but to give the youngster the best training." At another point in his address when referring to the vocational guidance work being done by his association, he said "I will admit that the Association of Commerce cannot afford to pay out its money in a purely altruistic proposition. It costs $33 a piece to hire and fire an individual worker. That is one reason why Henry Ford was willing to make a minimum wage of $5 a day." Mr. Wilson said that there was a business side to vocational training, but he could not see why a body of men who recognize this fact and say there is a financial reason should be discounted and their motives impugned.

Mrs. Young argued for democracy in education. She said that "education has not its origin or its cause or its solution in itself, but in the community." Hence it changes as the needs of the community change. It is now trying to adjust itself to new needs. Education today should be just as helpful to commerce and industry as to the professions. She then spoke of the remarkable change that has been brought about thru the introduction of handwork into the schools. "The public schools have found out how to hold the boys and girls." The handwork should not be given to one class of pupils merely; it should be given to all. She admitted that there was always the danger that school work would become too formal and routine in character, and then she added that this might become a danger in vocational school work also. In closing

she urged her hearers not to forget the great value of "this great unifying element of the public schools". She said that 150 teachers have already been put into the Chicago school system to teach vocational work.

One of the features of the whole convention was Dr. Roman's vigorous attack upon the advocates of the dual system in this country who, as he believes, have purposely misled us, either by statements or inference or both, with reference to the system under which continuation schools are operated in Germany. He pointed out that in Bavaria and Wurtemburg, which are most quoted, the unit system is in vogue; that in Saxony there is a mixed system; and in Prussia the dual system. He showed further that the continuation schools of Prussia were taken by Bismark from the Ministry of Education to the Ministry of Commerce and Industry on account of a religious fight, and that German professors of education recognize this fact, and say that in a country where there is no such religious controversy the unit system would be better.

PROPOSED LEGISLATION

In some respects the Saturday morning session was the best of the convention. In this there was the sharpest opposition. The speakers were Dora Wells, principal of the Lucy Flower Technical School; William B. Owen, principal of Chicago Normal College; Agnes Nestor, of the U. S. Vocational Commission; Edward Tobin, superintendent of schools, Cook County, Ill.; George Landis Wilson, of Chicago Association of Commerce; Margaret Haley, business agent of the Chicago Teacher's Federation, and Lewis Atherton, head of educational department of Swift & Co.

Mr. Owen presented printed copies of the bill proposed by the State Teacher's Association, and explained some of the provisions of the bill. Mr. Tobin told about the school field and garden project work in Cook county, and emphasized the value of the "money motive" in country school work. Mr. Atherton stated that in an investigation conducted by him 35 out of 37 employers found fault with the public schools. An analysis of their grievances led him to the conclusion that what was needed to remedy these defects was (a) better home training, (b) men to teach boys, and (c) a larger proportion of the child's time in the school. He believes that the schools should be open 5½ days a

week for 11 months in the year. From experience in selecting 750 boys from 8,876 applicants he had reached the conclusions:

(a) That the public school should hold the boys up to 16 years of age.

(b) That each line of work in the world must have its own school. We now have schools for lawyers, doctors, engineers, and pharmacists. Why should not each industry have its school. The complexity of business demands that each line should have its own, except in some of the smaller where a union of several would be just as satisfactory.

He thought the public schools ought

1. To indicate to a boy his bent;
2. To give him the power of sustained effort;
3. To train him to accurate and painstaking habits in his work;
4. To develop in him ideals of honesty and cleanliness.

In illustrating what he meant by the fourth item Mr. Atherton told of rejecting a boy because his fingernails were not clean, when in every other respect he was satisfactory. Miss Haley wanted to know whether he would be clean after he had been at the stockyards a few weeks. Especially she wanted to know what moral effect the work would have upon the boy. The main part of Miss Haley's address, however, referred to a chart of a block of school land in the center of the city of Chicago which had been leased at a scandalously low rate, thus robbing the public schools of millions of dollars. She said that if this piece of property were rented at the rate of some of the adjoining property, it would give the public schools $42,000,000 a year income. She laid the blame on the big business interests. "They strike out valuation clauses and renew for 99 years." She repeated a conversation with a large manufacturer who found fault because the boys from the public schools would not settle down in the routine, blind-alley jobs of his factory. When she asked him the reason he said that it was because the schools taught literature, music, drawing and the like. He wanted nothing but the three R's in the schools. Miss Haley said in closing that in view of past experiences, whenever a new scheme of legislation was proposed, she wanted time to study it in order to be sure that the big interests that had taken the children's lands were not coming back to take the children also.

Mr. Wilson surcharged the atmosphere of the room by stating at the outset of his address that the reason why public school teachers were taking up the cause of vocational education was "a desire to get

under cover while there was a chance." He said he could prove it by the history of education. Later, Professor Leavitt retorted that he couldn't prove it by contemporaneous history if he could by ancient. Mr. Wilson presented 22 reasons for "the necessity for separation of vocational education from the regular public school system." The first 9 of these, which are fairly typical, were the following:

1. In regular school circles vocational education is regarded as a heresy.
2. There is a temptation to provide first for those teachers already in the system who deserve advancement.
3. There is a temptation to use funds as far as possible for the regularly established work, leaving any surplus for the new or experimental field.
4. The established standards for teachers, when applied in the vocational field exclude some of the most competent special teachers.
5. Vocational education must be shaped to dovetail with the industry in which the group of pupils happens to be, whether it dovetails with existing school methods or not. "Unity" is only a harmful fetich here.
6. When pupils have left existing schools because they no longer are interested, the lack of interest will continue if the pupil is forced back to the same school environment.
7. The schools have had the examples, opportunity and demand facing them for forty years and pitifully few of them have even experimented with efforts to establish vocational education.
8. In those cases when something along vocational lines has been incorporated in the system, special vocational subjects in regular hands have become quite as academic as the regular curriculum.
9. True vocational education requires changes in method, ideals and mode of attack rather than addition to subjects. It is easier to start new with a clean sheet of paper than it is to erase, correct and modify.

Mr. Dean, in closing the discussion, said, "Do children exist for industry or industry for children?" He would answer "Neither." There must be compromise. He believes that the best compromise is found in the public schools rather than in a separate system of vocational schools.

CHILD WELFARE

At the last session the speakers were Saphonisba P. Breckinridge, assistant dean of women, University of Chicago; Anne S. Davis, director of vocational bureau, Chicago; Raymond Booth, field representative of the committee on industrial education and vocational guidance, Association of Commerce; and James Mullenbach, chairman of Illinois Child Labor Committee. This session was rich in suggestions from the ex-

periences of social workers. Miss Davis said that "the child of 14 does not need the industry. Does the industry need the child?" She then stated that many firms that formerly employed a number of children under 15 are not doing so now. Mr. Mullenbach stated that the large firms are not encouraging boys under 16 years of age. Miss Davis insisted that the test of any work for a boy of this age "is not, can he do it? but, what effect does it have upon him." Mr. Mullenbach argued for a broad opportunity in education. "We want to guarantee to the children of Illinois (a) health, (b) rudimentary education, (c) initiative and rational optisim as they look out upon life. For this the 'cultural background' is essential."

The session closed with a business meeting. Professor Frank M. Leavitt, of the University of Chicago, was elected president for the coming year. The other officers are Henry I. Greenebaum, a business man and member of the Association of Commerce, vice-president; Albert G. Bauersfeld, secretary; and Wilson H. Henderson, treasurer.

THE FIRST DUTY IN THE EDUCATION OF THE YOUNG IS TO PREPARE THEM, EFFECTIVELY, FOR USEFULNESS AND A FRUITFUL LIFE IN THE ACTUAL WORLD INTO WHICH THEY ARE SOON GOING OUT.—Charles W. Elliott.

PROPORTIONING GLUED JOINTS FOR STRENGTH

FREDERICK H. EVANS.

IT is the aim of this article to analyze the plain glued mortise-and tenon joint, point out the elements that contribute to strength, and state the principles of design in such a way that the reader can apply these principles to other glued joints.

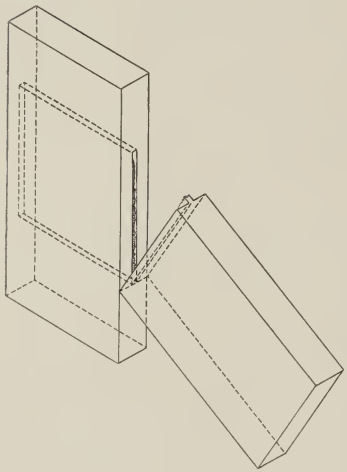


FIG. 1

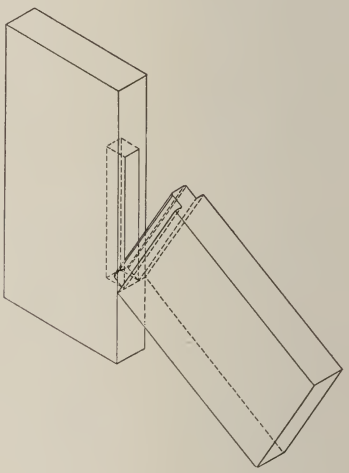


FIG. 2

The data upon which this article is based was worked out by Luther Wilson in his thesis, "The Testing of Wood Joints," and Christian Bockelbrink, whose thesis was entitled "Principles Underlying the Correct Proportions of Furniture Making Joints." The photographs in this article are from tests made by Mr. Bockelbrink. Without their work this article would not be possible, and the author wishes to give them full credit.

To begin with, let us look at the forces that act on a mortise-and-tenon joint. Consider a door, a table, a panel, or any construction in which two pieces are joined by any form of mortise-and-tenon.

If the stile is vertical the main force that the joint must resist is the force that would raise or lower the rail, the force that would turn

the tenon in the joint, the same as if the stile were fastened vertically and a person should either pull down or lift up on the rail. This is the kind of stress the joints in a door must bear from the weight of the door, the kind the joints of a table must bear from a push on the table top, the kind of stress the joint in a panel must bear when the panel is struck on a corner. Any stress sideways is either accidental or so small as to be negligible and need not be considered in this discussion.

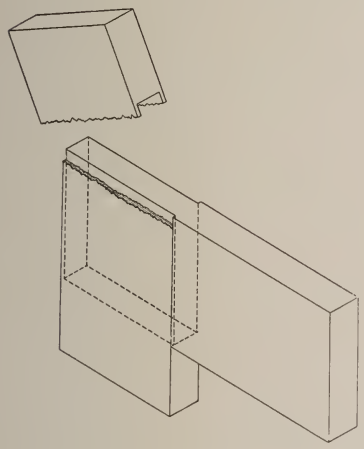


FIG. 3

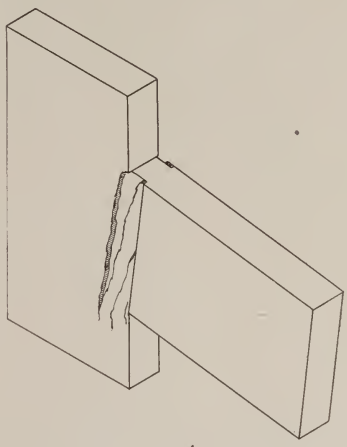


FIG. 4

A chain is only as strong as its weakest link, and a joint is only as strong as its weakest part, so the joint of ideal proportion is one, like the famous "One-Hoss-Shay," that is of equal strength thruout, and will not break at any one place first. In order to work easily into the theory, let us consider some joints of bad proportion and see where they will fail.

In Fig. 1 the joint fails because the tenon is not thick enough; in Fig. 2, because the tenon is not long enough; in Fig. 3, because the mortise is too wide for the stile; in Fig. 4, from the same cause as in Fig. 3.

If the correct proportion exists between the thickness of tenon and the depth of tenon, a number of test pieces can be mortised-and-tenoned to these proportions, and upon a test being made, the same number of joints would fail by breaking the tenon as would fail by pulling the tenon out.

In a similar manner, if the stile is not strong enough it can be made stronger by being made thicker. If the tenon is too weak for the stile it can be made stronger by increasing its width. This increase in width, of course, will not affect the proper balance between the tendency to pull out and the tendency of the tenon to break, for

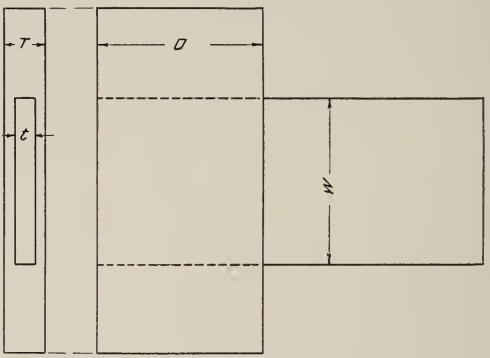


FIG. 5

this balance is determined by the ratio of tenon thickness to tenon depth.

To summarize what has just been written we can tabulate four possible ways of failure and their corresponding remedies as follows:

Failure	*Remedy*
Tenon breaking	Thicker tenon (t) (See Fig. 5)
Tenon pulling out	Longer tenon (D)
Stile breaking	Thicker stile (T)
Tenon of correct proportion but too weak for the rail.	Wider tenon (W)

In order to arrive at an exact statement of the relations of the dimensions t, T, D, and W (See Fig. 6) it will be necessary to briefly consider some elementary principles of strength of materials.

Suppose that a load L, Fig. 6, is applied to the rail sufficient to bend the rail to the breaking point. (The bent position is shown by dotted lines.) The break will start either at K by the fibers of the tenon being pulled asunder, or, by the fibers being pulled out of the

mortise in the cross lined area B. If the force L is down, the fibers in the top of the tenon are being pulled in the direction of the arrow from K.

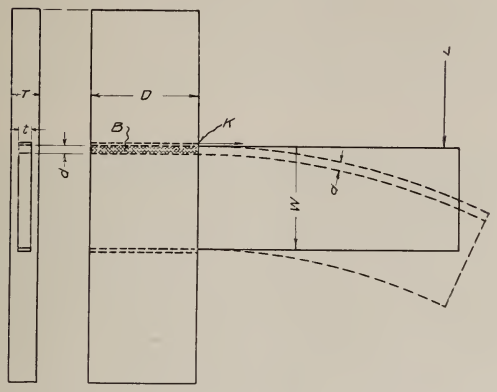


FIG. 6

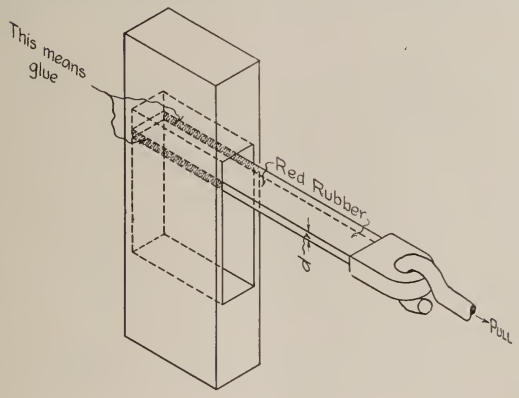


FIG. 7

For the sake of convenience in thinking, let us imagine that the top of the rail, tenon and all has been painted red (a color that will hold our imagination) and that the paint with all of its intensity of color has soaked in to exactly a depth d—no farther.

When L is sufficiently great to break the red strip, then the rest of the tenon will break immediately. Now, if we determine what is required to break the red strip, we have the strength of the joint.

Fig. 7 shows the status of the red strip. It is being stretched like a rubber band and is held in the mortise by glue on its sides. The glue on the top does not count as it is in the end grain of the mortise, and expansion and contraction soon breaks it. The resistance of the strip to being torn asunder is its cross sectional area in square inches multiplied by its ultimate unit tensile stress. If St is used to designate the ultimate unit tensile stress of the fiber, then its resistance to tension is $St \times t \times d$.

FIG. 8

Before we can determine the force required to pull the tenon out of the mortise we must determine which is stronger, the glue or the wood.

Fig. 8 shows tests made to determine this. The wood and not the glue failed in every case.

The resistance of the strip to pulling out will then be the area of glued surface $\times$ Ss where Ss represents the ultimate longitudinal unit shearing stress of the strip.

In terms of D and d, the resistance to pulling out of mortise $= 2 \times D \times d \times Ss$.

Of course, the glued surface of a mortise-and-tenon joint may fail and still the joint would hold together. But, since a joint would be loose if the glue did not hold we will consider the breaking of the glued surface a failure of the joint.

Equating the resistance to being torn asunder to the resistance to pulling out, we have

$$St \times t \times d = 2D \times d \times Ss$$

$$(1) \text{ or, } t = 2D \frac{Ss}{St}$$

This determines the relation between thickness of tenon and depth of tenon. Ss and S+ have long been determined by tests. A tabulation of such tests can be found in Kent's Handbook.

If the stile in Fig. 6 should break by bending, it would start to break at K. Since the stile and rail have the same bending moment about K, they should be designed as beams of equal strength. The

FIG. 9

strength of a beam varies as the product of its breadth by the square of its depth. Then, for a joint in which the mortise extends thru,

$$t\,W^2 = (T - t)\,D^2$$

$$\text{and } W = D\sqrt{\frac{T-t}{t}}$$

$$\text{since } D = \frac{t}{2} \times \frac{St}{Ss}$$

$$W = \frac{St}{2\,Ss}\sqrt{t\,(T-t)}$$

The strength of the joint and W would be maximum when

$$T = 2\,t$$

Then letting $T = 2\,t$

$$W = \frac{St}{2\,Ss}\sqrt{t^2} = \frac{t}{2}\frac{St}{Ss}$$

If we designate the ratio between St and Ss by R, that is, let

$$R = \frac{St}{Ss} \text{ then}$$

$$(2)\ W = \frac{t\,R}{2}$$

$$\text{and } t = \frac{2\,W}{R}$$

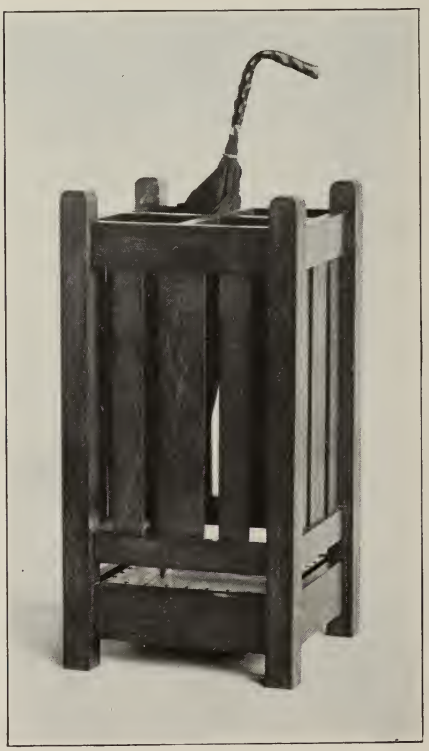
Comparing with (1) we see
that $D = W$.

For white oak the proportions of the joint according to the formulae deduced would be as follows:

$$t = \frac{T}{2}$$

$$D = W = 5\,T.$$

The accompanying photographs, Figs. 8 and9, show tests that were made to verify the theory just given.



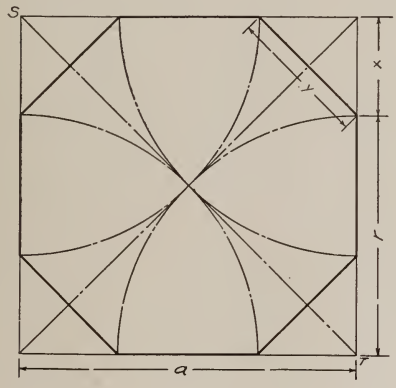
MADE IN BOYS' HIGH SCHOOL,
READING, PA.

ANOTHER LESSON FROM THE STEEL SQUARE

VELTERS V. LOGAN

THE steel square is the most useful laying-out tool of the mechanic. It is supposed to have originated, in its present form, in the shop of a New England blacksmith. What follows is one of the many interesting problems relating to this important tool.

Did you ever ask yourself the question "What is the origin of the octagon scale on the tongue of the steel square?"



Draw a square and an octagon within it by the old time method of arcs, using the corners as centers and half the diagonals as radius. Letter the drawing as shown in Fig. 1. From the corner triangle, of which y is the hypotenuse.

(1) $y^2=X^2+X^2=2X^2$

In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

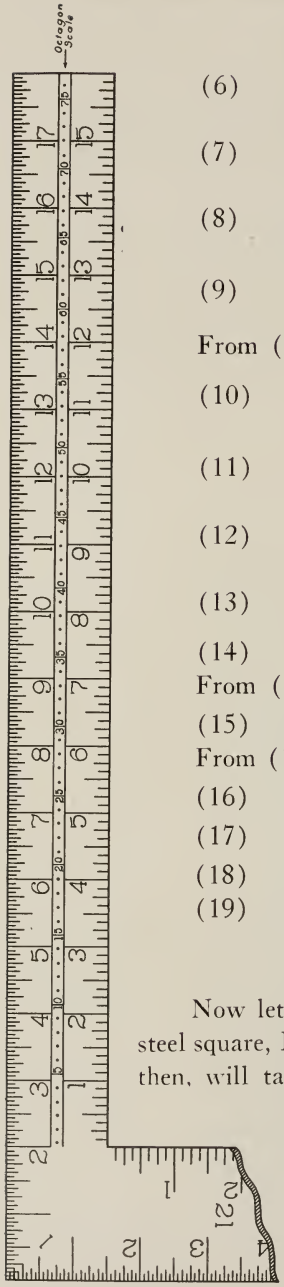
(2) $a=r+X$

(3) $X=a-r$

From the right triangle of which a is one side and 2r (ST) the hypotenuse,

(4) (2r)

(5) $4r^2=2a^2$



(6) $r^2 = \frac{2a^2}{4}$

(7) $r^2 = \frac{a^2}{2}$

(8) $r = \sqrt{\frac{a^2}{2}}$

(9) $r = \frac{a}{\sqrt{2}}$

From (3) and (9),

(10) $X = a - \frac{a}{\sqrt{2}}$

(11) $X = a - \frac{a}{1.414}$

(12) $X = \frac{1.414a}{1.414} - \frac{a}{1.414}$

(13) $X = \frac{.414a}{1.414}$

(14) $X = .292a$

From (1),

(15) $Y = \sqrt{2X^2}$

From (14) and (15),

(16) $Y = \sqrt{2(.292a)^2}$

(17) $Y = \sqrt{2(.0853a^2)}$

(18) $Y = \sqrt{.171a^2}$

(19) $Y = .414a$

Now let us compare (19) and the octagon scale on the steel square, Fig. 2. Suppose our square is 1″ on one side. It then, will take two divisions of the octagon scale to equal one side of the octagon, or Y. If we compare the length of five divisions of the octagon scale with 1″ the side of our square, we find that 1″ is just a little less than the length of the five spaces. That is, one division is a little more than 1/5″ and two divisions or one side of the octagon, "Y," is a little more than 2/5″. Then, since a=1″, Y

should equal a little more than 2/5a or [see (19)] .414 is slightly greater than $\frac{2}{5}$—.4=$\frac{4}{10}$=$\frac{2}{5}$

Now, let us derive a formula for the area of an octagon in terms of one side.

Let Z = the area of the octagon

From (18),

(20) Y^2=.171a^2

Now, noticing that Y^2 is the area of the four corners of the square outside of the octagon,

(21) Z=a^2—.171a^2

(22) Z=.829a^2

From (20),

(23) $a^2=\frac{Y^2}{.171}$

From (22) and (23),

(24) $Z=.829\left[\frac{Y^2}{.171}\right]$

(25) $Z=\frac{.829Y^2}{.171}$

(26) $Z=4.85Y^2$

or (27) $Y^2=\frac{Z}{4.85}$

(28) $Y=\sqrt{\frac{Z}{4.85}}$

(29) $Y=\frac{\sqrt{Z}}{2.2}$

If you have a square area, say 25 ft. on a side, in which you wish to place an octagon floor, a = 25 ft. and from (19)

(30) Y=.414a

(31) Y=.414 x 25 ft.

(32) Y=10.35 ft. = length of one side of octagon.

The surface area of the same octagon may be found by (26),

(33) $Z=4.85\ Y^2$

(34) $Z=4.85x10.35^2$

(35) Z=4.85x107.12

(36) Z=519.53 sq. ft.

Put the figure and formulas (19), (26) and (29), in your note book. They may come handy.

AN EXPERIMENT IN THE MAKING AND USE OF FURNITURE BY SECOND GRADE PUPILS

Iza Edith Andrix

Note. Speyer School is maintained by Teachers College, Columbia University, as an elementary demonstration and experimental school. In its curriculum industrial arts receives as much time as any other school subject. For three years the second grade has attempted to demonstrate what pupils of an average age of seven and one-half years could do in strongly motivated work in wood. There were twenty children in the grade. Nearly all had had one year of kindergarten work preceding the first grade. In each of these years simpler forms of woodwork are included. The time given to this furniture problem occupied but a little more than two months, beginning in February, and averaging about three hours a week. But it should be noted that not more than half of the children usually worked upon the furniture at one time. Bed clothes and table linens were also made during this period, and other work was often prepared by the part of the class at their seats. Most of the furniture work was done in the open floor space or on the desks of the schoolroom, or in the hall just outside the schoolroom. One work bench is kept in the schoolroom.

The use of screws instead of nails for most of the joints gives a very strong form of construction. The ease with which the children could do the work was a constant surprise to the almost daily observers, many of whom were shop teachers of years of experience. For the grade as a whole the expense is not large. For thirty it would need to be but little larger than for twenty. Working with half of the class at a time, in groups of two or three children on each piece of furniture, greatly reduces the cost per child and gives the values of team work. Some other forms of work taught in direct relationship to the furniture making are suggested by Miss Andrix.

F. G. Bonser, Director Industrial Arts, Teachers College.

FOR three years, the children of the second grade, Speyer School, have made three or more pieces of furniture of kindergarten size. At the end of the year some of the pieces were either presented to the first grade and kindergarten, or all were kept, and the succeeding class made new pieces to enlarge the set.

The children's motive was to make furniture to use in playing their stories. After the first year, "When are we going to make furniture as the second grade did last year?" was repeated almost daily from September until the lumber appeared in February.

After the pieces of furniture were decided upon, pictures of each piece were collected from furniture catalogues and from the furniture

leaflets of Leavens & Co., Boston. The pictures liked best were selected and the reasons for the choice stated. These reasons were later summed up on the blackboard, and the following was written in our "Booklet of Knowledge."

Good furniture should:

1. Suit our need.
2. Be strong.
3. Be beautiful in form and color.
4. Be plain and not hard to dust.

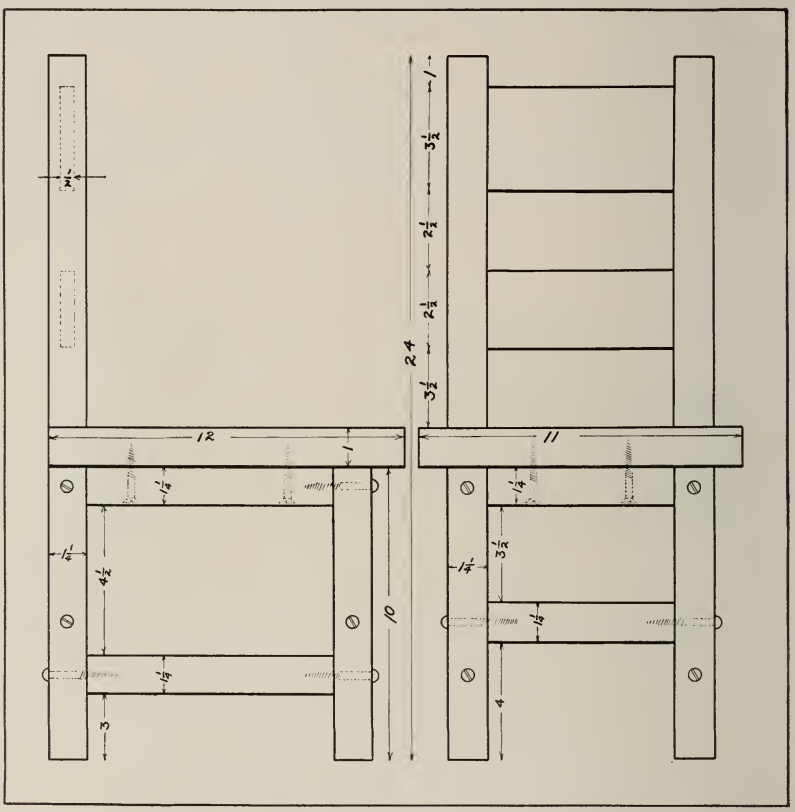
Our furniture should also be plain enough so that we could make it.

WE THOUGHT WE COULD MAKE A BED MUCH LIKE THIS AND CHAIRS LIKE THIS

During the art period, the different pictures were removed from sight and the children were told to make a brush sketch of the front and side views of each piece of furniture as they thought it should be if the sketches were to be used as guides when making the furniture. Of course, there was great variety of detail in these sketches which afforded opportunity for discussion of proper spacing and proportion at the time, and which called for a choice, supported by good reasons when each piece of furniture was made.

The size of our schoolroom called for small furniture, yet, "It must be large enough to use." Different chairs and tables in the building were tried, and those in the kindergarten were decided upon as "just right." The measurements, thought necessary by the children, were taken. An illustration of the exact measurements and lumber order worked out by

the teacher for her own use for each piece of furniture is shown in the following:



MEASUREMENTS AND LUMBER ORDER FOR ONE CHAIR

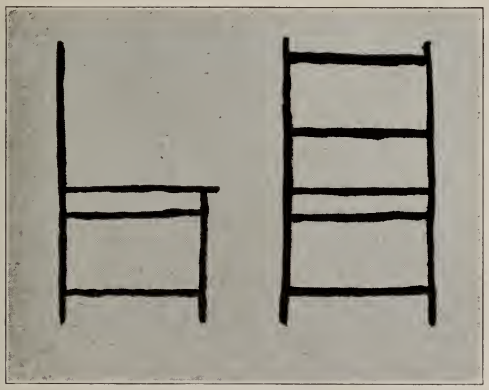
Measurements	*Lumber Order*
2 tall legs, 24x″1¼″x1¼″	2 pieces, 38″x1¼″x1¼″
2 front legs, 10″x1¼″x1¼″	1 piece, 44″x1¼″x1¼″
4 side rounds, 8½″x1¼″x1¼″	1 piece, 36″x1¼″x1¼″
4 rounds, back and front, 6⅝″x1¼″x1¼″	1 piece, 24″x1¼″x1¼″
1 upper back support, 6⅝″x3½″x¾″	1 piece, 10″x3½″x ¾″
1 lower back support, 6⅝″x2⅝″x¾″	1 piece, 10″x2⅝″x ¾″
1 seat, 12″x11″x⅞″	1 piece, for two chair seats, 24″x11″x ⅞″

When the lumber came, the children were told that the carpenter had left a great deal of the sawing for them to do, and that the two table legs were in one piece, a short and tall leg of the chair in another, etc. Slips of paper like the following were handed each child:

Lumber for two table legs, 40 inches long.

Lumber for a tall and short leg of chair, 38 inches long.

Each child found the lumber indicated on the slips quite readily, but when those who were to work on the chairs gathered together to plan



ONE OF OUR BRUSH SKETCHES

what to do next they were surprised. Some of the group had a "thick piece," 2″x2″, for the chair legs; others had a "thin piece," $1\frac{1}{4}$″x$1\frac{1}{4}$″; and still others had a "middle sized piece oblong on the end." They immediately decided that the "thick" lumber was best for the table legs, and the "thin," square pieces were best for the chair legs. One child suggested that it would be safer to tell how thick the table leg must be on the slip, and in trying to follow this suggestion the width was discovered. The slip, when completed by the children, read:

Lumber for two table legs, 40 inches long by 2 inches wide by 2 inches thick.

This bit of knowledge was proudly formulated by the children and written in their Booklets as follows:

"A discovery. When we measured our lumber today, we found we must always know:

1. The length, width, and thickness of each piece of lumber."

The next day the method of indicating where to saw was demon-

strated and the class started to work. The corrected slips of the day before were consulted, but one by one, the children discarded them for those containing the measurements made of the kindergarten furniture. Here the result of the "discovery" became apparent, for the width and thickness of each piece were added to the slips with great delight.

The top of the table had not been sent with the remainder of the lumber. In the shop, we found a board which was "exactly the size."

EACH OF US HAD SOMETHING TO DO

When placed in position, it proved to be much "darker than the rest of the furniture." "The lines in the wood were straight, too!" "Paint it!" was suggested. But, "People do not paint furniture, they stain it," left as the only solution, "Send to the College for another top." The written order was begun, but not finished immediately, for, "What if the college carpenter sends us a dark piece, too?" checked all progress. An examination of labeled samples of different woods, accompanied by an explanation of them by the fourth grade, aided greatly in completing the order. It also gave a second thought to add to our "discovery."

"2. The kind of wood, because woods differ in color, grain and hardness."

All measurements were tested by the teacher before the lengths were sawed. The sawing of all lumber except that for the shelves and the table and buffet tops was done with the New Langdon Mitre Box.

In putting the parts together, screws were used, as they made the furniture strong and were easy for the children to manage. After determining the number of screws needed, and indicating their places in the carpenter's way, a hole was bored and the screws soaped and inserted.

Preceding each day's work, the class planned the work to be done on each piece and decided upon the best method of doing it. Two children were then appointed to carry out each task. This kept about ten or

WE OFTEN HELP EACH OTHER

twelve children at work on the furniture each day, while the remainder of the class either prepared a lesson for the day, or when the furniture was well under way, made the bed and table linen .

The class of last year had on hand in September a table, bed, four chairs, and a china closet in good proportion to each other. They also had a buffet, made the first year of the experiment, which was smaller than the other pieces in the dining room set. It was finally decided to make a larger buffet, a linen chest, and a new bed, the first grade having asked for the old one. In taking the measurements and selecting the proper pieces of lumber from their measurements, the children faced the same problems and made the same discoveries as had been met and solved in the preceding years, tho in this case more quickly because of the greater differences in the width and thickness of the lumber for these particular pieces of furniture.

For finishing, Sherwood's Fumed Oak Acid Stain was used, as an acid stain penetrates the wood better than an oil stain, does not streak, and is best for soft woods. It was put on with medium sized brushes and immediately rubbed with a cloth.

Nine weeks averaging three hours a week were taken in making the bed, buffet and linen chest, two sheets, a bed spread, pillow case, and table cloth.

BED CLOTHES ARE AS IMPORTANT AS BEDSTEADS

For a week after the furniture was completed, some "early bird" made up the bed each morning, but the majority of the class seemed perfectly contented in touching the furniture, looking at it, and talking about which piece was hardest to make. At last, there came a day and a story which ignited the thot, and, "Let's play the story and use our furniture," swept over the room.

The frequency of the request to "stay after school and put the linen away," and the length of time taken in the accomplishment of this self-appointed task bore witness that the teacher's opportunity had arrived to aid the home in eucouraging a knowledge of the science and art of home-keeping.

The children were divided into groups or families, four in a family, and each group assigned a certain day in which the furniture was to belong to them. In discussing the things they would like to do, opportunity

was given for class demonstration on just how to sweep and dust a room, make a bed mother's way or "nurse's" way, set the table, etc. The school physician and the school nurse became interested and supplemented the discussion by short talks on, "the sleeping room at night, and during the day," "the care of our teeth," and other appropriate topics.

Fifteen minutes to nine each morning usually found the family at school, with one window opened, dusting, making the bed for the dolls,

OUR BED ROOM

and arranging the dining room. A luncheon of milk and crackers was served to this grade each day, and, of course, the family ate it "at home." The real dinners proved the greatest treat, however. Each member of the group brought his noon lunch to school. Each child arranged his place at the table, went to the kitchen—a desk in the schoolroom—to get his dinner, and placed it appropriately upon the table. After the meal each child removed his dishes to the kitchen where they were washed and dried by three children while the fourth swept and dusted the dining room.

This program was varied occasionally, for the children delighted to invite a favorite teacher or other friend to take dinner with them.

With the furniture as a starting point, the lumbering industry was studied, represented on the sand tables, and dramatized.

In connection with the making of the bed and table linen, the knowledge gained in the first grade of the cotton, silk, and wool indus-

tries was reviewed. The charts made by the sixth grade in their study of flax were borrowed and explained.

OUR DINING ROOM

OUR BED, CHAIRS, AND TABLE[1]

Dishes for the dining room were also made. A plate, five or six inches in diameter, was molded on a five-cent pie pan by each child. These clay plates were fired, glazed, and fired again when they were ready for use.

[1]The screen was made by the children. Placed around one corner of the schoolroom it encloses "bed room" or "dining-room."

Here we have merely space to mention that many problems in number, nature study, geography, English, and fine art grew naturally out of this work. We found it intensively interesting and we enjoyed every minute of it. We felt that in every lesson we were growing in both mind and body. The work led us to see new things roundabout us every day—things we had not noticed before. We think we shall never go into a strange room, or help in caring for our bedroom or dining room, or pass a furniture store, or buy furniture for ourselves without remembering some of the things we have learned in this making and study of furniture.

DESIGNED AND MADE BY A FRESHMAN BOY, BOYS' HIGH SCHOOL, READING, PA.

EDITORIAL

THERE is at the present time great popular interest in various legislative proposals relating to vocational education, both State and Federal, and especially in the fundamental question as to whether vocational education shall be developed as an integral part of a well-rounded scheme of education, under unified control, or whether the interests of such special schools, and of the boys and girls to be educated, and of society in general, will be served best by organizing separate boards of control for vocational schools independent of the regular boards of education. As a contribution to the effort to work out a solution of this very fundamental problem, the following analysis of the reasons which are being urged on both sides of the question is presented.

Argument For Unified Control

1. Separate control would divide and duplicate the administrative educational machinery.[1]

2. Separate control would tend to stop the movement now under way to vitalize general, academic education by the introduction of new activities. Separate vocational education would leave general education to stagnate in remoteness from the realities of contemporary life.

3. Separate control would tend to check the movement to keep pupils in school for a longer term of years, since many would leave a purely academic school at the earliest possible moment in order to get their "working papers," trusting to the part-time or evening schools for further training.

4. Separate vocational schools work to the disadvantage of the pupils because of the narrow type of work such schools would be forced to offer.

5. Industrial workers should not be subjected to a training for efficiency separate from education for citizenship, intelligence, and character.

[1]For further discussion of the position here summarized, see: Vocational Education and the State, by Dean Eugene Davenport, College of Agriculture, University of Illinois; *School and Home Education,* Dec., 1914, p. 131.

An Undemocratic Proposal, by Professor John Dewey, Columbia University, New York, N. Y.; VOCATIONAL EDUCATION, May 3, 1913, p. 374.

6. Extreme subdivision of labor, rapid changes in industrial methods, and mobility of the laboring population are reasons against trade training which is not an integral part of a general plan of education for industrial workers.

7. Separate schools for industrial workers would not harmonize with a policy of discouraging undesirable class distinctions.

8. The experience of several states, but especially Massachusetts and Wisconsin, has not developed strong popular demand for separate vocational schools, independent of the regular public school system. Massachusetts began by organizing a special commission on industrial education, for the purpose of administering the law and fostering the development of independent industrial schools. After experimenting with this plan for a time, the separate commission was abolished, and the responsibility for control and administration of all forms of educational effort was lodged with the State Board of Education, while local boards of education were given the power to organize vocational schools in connection with the regular public school system.

The Wisconsin plan, which has been cited as a successful example of separate administration, does not, strictly speaking, afford separate, independent control of vocational schools. The state superintendent of public instruction is *ex-officio,* a member of the state commission on industrial education. Wisconsin, it should be noted, has no state board of education. The city superintendent of public schools is, *ex-officio,* a member of the local board of control for vocational schools, and it is provided by law that the other members of this board shall be designated by the local board of education. The state official in charge of the administration of the law governing vocational education is a deputy in the office of the state superinendent of public instruction

9. The experience of agricultural college administration in the States seems to demonstrate the wisdom of developing such a college as a department of a university, rather than as a separate institution. The presumption is that similar experience would be encountered in the secondary school period.

10. The establishment of separate vocational schools would result in the subtraction from the regular public schools of all the most energetic pupils, except those who are bent along literary lines, to the detriment of both types of schools.

11. If it could be shown that adequate vocational training can be given only in separate schools, it would still be financially impossible to

establish as many schools as there are vocations, except in densely populated large cities.

12. Separate control of vocational schools would obstruct, if not prevent, that readiness of transfer from one type of school to another, so desirable for pupils during the early period of differentiation of courses, that would be facilitated by the organization of all forms of education under the control of a single board of education.

13. The experience of boards of education in handling drawing and manual training does not forecast with certainty what their experience will be with industrial education. Both boards of education and popular sentiment have changed materially since the early days of misunderstanding of the place of practical activities in an educational scheme.

14. The recommendations of the commission on Federal aid to vocational education, and the provisions of the proposed act dealing with this subject, now pending before the Congress, accept the centering of responsibility for all forms of educational effort in one office or board as the logical method of procedure.

Argument For Separate Control

1. Separate vocational schools represent an effort to do for the ordinary vocations what is now done thru existing schools, for a very small class in professional and managerial positions.[2]

2. Separate organization and control of vocational schools is a direct and practical effort to solve a specific problem, unencumbered by subsidiary attempts at the reform or reorganization of present school systems.

3. Separate vocational schools are intended to supplement the work the existing schools are now doing, not to compete with them.

4. Separate control of vocational schools is necessary to protect them from unintelligent management, obstructive oppostion, and pedantic diversion from their real purpose, on the part of unsympathetic school officials.

[2]For further discussion of the position here summarized, see:

Principles that Should Underlie Legislation for Vocational Education, by Dr. Edwin G. Cooley; *Proceedings,* National Society for the Promotion of Industrial Education, Philadelphia, 1913, p. 146.

The Need for Vocational Schools, Report to the Educational Committee of the Commercial Club of Chicago; *Educational Review,* December, 1912, p. 433.

Criticism of the Chicago Commercial Club and its Vocational Education Bill; VOCATIONAL EDUCATION, September, 1913, p. 24.

5. Separate control of vocational schools would prevent the work from being culturized and made ineffective by impractical school teachers. The experience of drawing and manual training in the public schools is cited to illustrate what is to be expected if this new problem is turned over to the same people for solution.

6. Separate control of vocational schools is necessary to secure practical and vital coordination with the real work of the world, and the cooperation of persons who carry on the vocations—employer and employed.

7. Experience has shown that vocational schools are successful only when administered by the class of men and women with whom the youth will be associated during vocational life. Applications of general education to vocational life can be made only by men and women who know the vocations.

8. Separate control is necessary because adequate preparation for vocational efficiency can be given only by those for whom this task is the chief and dominant purpose.

9. It is impossible, with the pressure of existing duties and responsibilities, to provide the proposed instruction in the present system of elementary and secondary schools.

10. Separate administration and development of a new type of school are necessary because existing facilities fail to reach a very considerable proportion of our boys and girls.

11. Separate control and separate support are necessary because present school revenues are insufficient for the present needs of the school.

The members of the editorial staff of this magazine have gone on record as favoring a form of administration by which all forms of education supported by public taxation shall be under a single management—the regular public school trustees, or board of education.[3] After weighing carefully the arguments brought forward in support of both sides, the conclusion is reached that the existing public school system should be permitted, or required, to expand, by the development of such new types of schools, or departments within schools, and courses of study, as may be necessary for the solution of the problems of vocational education. Expert assistance and wise counsel should be sought wherever it is obtainable, but responsibility for the direction of public schools and for the expenditure of public school funds should not be divided, as proposed

[3]See Editorial, the December number, 1914, p. 238.

by those who would introduce special boards for the control of vocational schools. All of the advantages to be gained by the separate board can be secured thru the organization of suitable cooperating advisory committees, without the dangerous division or delegation of responsibility.

There can be no question of the demand for, and the need of, vocational education. It is insistent, and must be met. There is ample evidence that the public school teachers of the country are alive to the existence of the demand, and are seeking to know what ought to be done. Their intelligence, ability, and influence should be conserved in the development of a unified educational system.

William T. Bawden.

Industrial-Educational Survey

The vocational school survey idea seems to be in the air. Perhaps the same might be said of the method of conducting one. Anyhow it is clear that the problem of conducting an industrial-educational survey is different from that involved in making a general school survey. The school survey merely concerns itself with existing organization, and questions how well that organization is doing its work, and in what ways its methods might be improved and its work extended. On the other hand, an industrial-educational survey deals with ideals, plans and proposals which have been offered as partial solutions for dealing with a set of most important industrial problems that are acutely realized, but which have been only in a small measure analyzed.

Unquestionably, industrial-educational surveys are bound to become popular, and what is more important, will become necessary. It has been perfectly proper for a community to introduce some vocational instruction without going deeply into the discovering of data upon which such schools should be built. But it will be unwise to continue the spending of money for such instruction or to add appreciably to its cost without having definite industrial-educational data back of the local movement. Furthermore, it is very probable that the United States government will expect, when it gives national grants to vocational instruction, that a state and community show a need for such instruction, and that it present a plan to some national board of how the money is to be expended. Again, after we have data relative to devising plans for starting vocational schools to meet a determined pressing industrial need, we shall still require data to inform us of just what shall be taught in these schools and just how it shall be taught. In other words, the vocational school must have

constantly at hand industrial and educational data, so organized as to be helpful to vocational instruction. In a word, we must find out what industry offers workers, and we must discover what vocational education can give the worker.

Mutual Responsibility Between Industry and School

It is clearly evident that we are rapidly moving to the point where there will be a sort of bartering between school and industry, where the school will say, "Yes, you may have our children, but only under certain circumstances," and where industry will say to the school, "We can and should teach some of these things within our own field, and we do not need or expect your help, but there are some things which you can and should teach before these young people come to us and also while they are at work." This conception of the responsibilities and relationships of the school and of industry means eventually a study of industry with reference to the educational value of certain processes and the contribution which industry may make to the individual in the way of wages, health, sanitation, and accident prevention.

It may be a long look ahead, but most assuredly some day a joint certificate will be issued to the child who is about to go to work. From the Labor Department, there will be a guarantee that the place in which the youth is to work is healthy, free from occupational disease, that the hours are reasonable, and the wages sufficient; from the Health Department that the boy or girl has a health sufficient to withstand fatigue and strain incident to all work; from the Educational Department that the applicant is qualified intellectually to enter employment.

Two Kinds of Information Needed

It is not difficult to see that a clear distinction must be made between the sort of information valuable for judging as to the nature and desirability of different sorts of vocations and the sort of information needed for planning courses of study, outlines, and formulations of instructional methods. Without intending to be critical, it is well to note that these two sorts of information have commonly been treated without differentiation. It is, for example, essential that we have information concerning wages, unemployment, number of workers, degree of organization by unions, and the like, in order to judge intelligently concerning the nature and desirability of different occupations from the vocational point of view. But nevertheless, after we have once decided to attempt definite vocational

instruction, training young people for the particular occupation studied, the consideration of wages, hours, unemployment, etc., does not affect the character or amount of instruction which will be given in the schools.

It does not seem as tho we are clearly defining the survey field. We confuse, for example, the question of whether paper flower making is a desirable occupation, with the question of a course of study in flower making in a girls' trade school. We associate the question addressed to organized labor, relative to the advisability of introducing an all-day trade school with the question of whether the school should teach mechanical drawing or blue print reading.

One set of questions may concern vocational guidance; the other set may concern vocational education. For example, is paper flower making a desirable occupation? Does it offer opportunity for advancement? Do the wages afford a decent living? How many years are required to attain dexterity? All of these questions are the concern of vocational guidance. On the other hand, the evaluation of such a course from the standpoint of technical processes, the number of processes possible to introduce into the instruction, the length of time required for each process, their sequence in the school and adaptability to school methods are matters of concern to vocational education.

To paraphrase an idea of Mr. Haggerty's on the "Analysis of Occupation," the writer would say relative to a survey of an occupation for educational possibilities that to analyze the occupation of blacksmithing from the standpoint of vocational instruction is to analyze the blacksmith, not every blacksmith, but rather the expert blacksmith; not every movement that he might make in every process that he might follow but rather the essential ones which he must make; not the random and useless ones, but the ones that lead directly to the desired result, which in this case is a study of the work which he does and the processes which he follows in order that proper shop outlines may be evolved for vocational instruction. When once this analysis of an occupation has been made, an adequate statement of the facts will give us a science of that occupation for use in vocational education.

ARTHUR D. DEAN.

OF CURRENT INTEREST

LEGISLATIVE OUTLOOK IN ILLINOIS

IT has been said that the state of Illinois is the last hope of the advocates of the dual system of administration of vocational education. If the fight is lost in Illinois, there is no chance for the dual system to get a hold in the United States. At the present writing, with the Illinois States Teachers Association and the State Federation of Labor taking the lead against the dual system, with the women's clubs headed by the Women's Legislative Congress, with the state organization of the Retail Dry Goods Merchants and other state and local, commercial and professional organizations declaring for the unit system, there is every reason to believe that the dual system can never be put into law in Illinois.

If one has faith at all in the progressiveness of the schoolmen of Illinois he must believe that the unit system can be made to yield all of the real advantages of the dual system and many more. Moreover, the general public is now so well aware of what should be expected that the schoolmen will be obliged to produce results. An intelligent and awakened public opinion will insure that.

READING OUTLINES IN APPRENTICE SCHOOLS

There are in Hungary two types of State directed industrial schools: (1) continuation schools for apprentices, authority for the administration of which is lodged with the Minister of Education; (2) trade and technical schools which, because of the desire for close correlation with commercial activities and interests in the Empire, are placed under the direction of the Minister of Commerce. The following outlines, translated for the U. S. Bureau of Education, are taken from the latest official "Syllabus for Readings," prepared for use in the course of study for the continuation schools for apprentices:

FIRST YEAR

(1) *Industrial Life.*—Extracts from the lives of celebrated manufacturers, exhibiting the qualities demanded in a manufacturer (love of work, exactitude, honesty, sobriety, the spirit of economy, purity of morals, respect for the law,

patriotism, a conciliatory character); the duties of the apprentice toward his master or guardian; (rules of good behavior in the family, the school, and in public life.)

(2) *Geography.*—Description of Hungary. Before and during the lessons the pupils learn to "read" the map, so as to discover the principal cities and highways of the country. The readings bear on the physical conditions of the country, and on the occupations of the people.

(3) *History of the Hungarian Nation.*—The historical facts which emphasize the patriotic virtues and the most brilliant epochs of the nation's past are related.

(4) *Public Hygiene.*—Influence of hygiene on the life of individuals and the nation. Wholesome and unwholesome food; alcoholism. Influence of habitation on the health (soil, aerification, lighting; manufactories and their sewage). The influence of a calling on the health (unhealthy manufactories and workshops). The care of the body (cleanliness, exercises). Infectious diseases. Prophylactics.

Selections from Hungarian literature bearing on the historical and geographical subjects.

SECOND YEAR

(1) *Geography.*—The countries of Europe and the other parts of the world. "Reading" the map of the world. The readings especially refer to the European countries which have an important bearing on Hungarian industry—that is to say, in the first place to Austria and the Balkan countries. Other countries follow.

(2) *Hungarian Legislation.*—The fundamental laws of the Hungarian Constitution: I. The Royal Power, the right of succession. II. Legislation; electoral right. III. Administration, Ministries, municipalities, communes. IV. Taxes, military service. The other lessons have reference to legislation concerning industry.

(3) *Physics.*—The properties of bodies, forces, mechanical appliances, engines, dynamos, etc.

(4) *Chemistry and Technology.*—Oxygen and nitrogen. Air, nitric acid, water, carbon (fuel, illuminating gas). Sulphur (sulphuric acid). Chlorine, bleaching. Silicic acid (quarts, sand). Boric acid, phosphorus. Lucifer-matches. Metals and salts; potash, soda, rock salt, lyes, salts of ammonia. Limestone and chalk. Cement and plaster. Aluminum, alum, clay and glass-making. The heavy metals; iron, copper, nickel, zinc, tin, lead, gold, silver. Metallurgy. Principal metallic salts, sulphate of iron, sulphate of zinc, etc.

Such selections from literature as will assist in the development of the mind and character.

THIRD YEAR

(1) *Physics, Chemistry and Technology* greatly extended.

(2) *Polotical Economy.*—Importance of agriculture, of industry and commerce. Domestic industry; small and large industry. Division of labor. Social and industrial role of machinery. Means of transport. Entry dues. Taxes. Important institutions for industry; associations, banks, postal savingsbank. Banks of issue. Industrial liberty. Chambers of commerce and industry.

Such selections from Hungarian literature as will tend to a satisfactory formation of the character and mind.

A VITALIZED SCHOOL

Park Ridge, N. J., has vitalized its elementary schools by a system of thoro going correlation of courses that are closely related to real life. Beside a room for woodwork for the boys, and rooms for sewing and cooking for the girls, the school has a printing shop, a hen house and a bank. The work in all these is dovetailed together.

The domestic science department serves daily lunches to students and teachers with an aggregate profit of from $1.50 to $2.50 a day. Each day the bills for the material used, with a statement of receipts, are sent to the commercial department in the high school, where all the accounts are kept. At the end of the month the students who have had charge of accounts prepare a detailed statement showing receipts and disbursements and the balance of profits.

We are indebted for this information to the account given by Supervising Principal Hubert in the *Education Bulletin*:

The bills from the domestic science department are also used in the grades, where they are made the basis for the study of business forms. All extensions and footings are checked and if found correct the OK of the class is placed upon them. If an error is discovered the class takes up the matter with the person furnishing the material and sees that it is corrected. Hardly a bill comes in that does not contain material which readily lends itself to the subject of geography, spelling, English or history. These points of contact are carefully watched and are used according to the alertness and resourcefulness of the teacher.

The classes in manual training are encouraged to study the needs of the school, their own personal needs and the needs of the home. A concrete example will illustrate: In the domestic science building are about fifty windows. Last spring the necessity for screening these windows was brought to the attention of the boys. They studied material, cost, best type of frame, etc., and then built and hung screens in all the windows. The girls needed a kitchen closet. The boys planned and built it, saving at least $25.

The printing department serves as another adjunct in making the regular work of the school concrete, and emphasizes the desirability of care, precision and accuracy. All school stationery and all blank books and forms used in the banking department, as well as the school paper, are printed here.

We have a chicken house where fifteen to twenty hens are kept. The possibilties in this department in a rural community are almost without limit. At present the hens are cared for by the boys of the sixth grade, who are happy in doing the work. At the regular market price, they furnish to the kitchen, the eggs that are used in cooking. The boys doing this work study the subject of chicken husbandry, keep strict account of the cost and income and are able to show whether the hens show a profit or loss.

The school bank has proved to be one of the most popular enterprises that we have ever undertaken. It is organized and operated just as any bank would be. The teacher in charge spent considerable time at a national bank studying books, methods, etc. The accounts are kept precisely as in a regular bank, all work being done by the students in the commercial department of the high school. Any pupil in the school may deposit any amount from a penny up. Interest at 4 per cent is allowed on all amounts from $1 upward. Withdrawals are made on signature of the depositor countersigned by parent or guardian.

ELEMENTARY INDUSTRIAL WORK IN LOUISVILLE

In Louisville, Ky., the Prevocational School started September, 1913, with two teachers, one academic and one shop teacher, and an average attendance of 32 pupils. After a successful year the school was moved last September into quarters large enough for 80 pupils.

The school is for those children who have completed the sixth grade, tho children below this grade who are in their fourteenth year are admitted. In addition to academic work the boys have printing, woodworking, and electric wiring, and the girls have trade sewing, printing and bookbinding.

In the academic department inspiration is derived from the activities of the shops. Jobs are figured, costs are estimated, letters written, bills made out, and accounts kept just as in the various operations of a business house. The mathematics, English, geography, history all have a commercial basis. There is a tangible value in the academic work and this value is appreciated by the pupils. In the shops, the commercial side of the work is prominent. Producing work in quantities is carried on, and the time element is taken into account, as would be the case under actual business conditions. The work undertaken is either for the school or for school organizations.

WHY PRINTING IS IN THE SCHOOLS

It has been said by Henry Turner Bailey that printing is preeminently the art of democracy. "As baskets were the commonest objects to the Indian, and so the chief subject of his art; as pottery served the early Greeks and became the characteristic art craft of their civilization; as common kitchen utensils of bronze became the fine art of the Romans; as armor and weapons called forth the utmost skill of the craftsmen of the middle ages—so printed things are destined to become characteristic

of our American life. * * * The high tide of printing is yet to be." It stands as one of the best means for training our boys and girls.

Just how this last statement is true has been pointed out by William B Kamprath, principal of the Buffalo School of Printing, when he says: "There is no other line of activity that is so peculiarly rich in its associations as printing. It underlies all learning; its influence will function in all branches of academic training—language, reading, spelling, drawing, arithmetic, history, geography, science, etc. Shop activities in a printing school soon invade and transform these departments, and vivify and vitalize them by substituting reality for bookishness. Successful work in a printing course depends upon the mastery of these academic subjects, and from the very outset pupils recognize the need of these studies. They may never before have thought them worth while, but they soon see their utility. They discover that the subject necessitates above all things else a thoro and intimate knowledge of language. In the setting of cold bold type there is no way of disguising ignorance. Every improper punctuation mark, every misplaced capital, every misspelled word, every poorly constructed sentence is a 'Daniel to come to judgment' when once in print."

S. J. Vaughn, DeKalb, Ill., says much the same thing, but in another way: "My experience with the school print-shop justifies my original enthusiasm and confirms my early belief that printing will work wonders in the school. Send me a sleepyheaded, uninterested, bad boy from the school, the street, or the jail, and I'll put him into the print-shop half of each day with a little instruction, and he will wake up, clean up, and get busy. He'll at once become absorbed in this real man's work; his pride will grow with his skill and he'll learn more spelling, more arithmetic, more patience, more manhood in three months than in the previous three years, if not in all his previous life. He is fascinated by the work. Interest insures skill, and skill intensifies interest. Boys will cut a baseball game or any other sport for the privilege of handling type and press."

"The art element in printing is as ever present as the language element," to further quote Mr. Kamprath. "Whether it be a letterhead or business card, an advertisement or a page of straight matter, the principles of drawing are always a paramount issue. Order, unity, balance, proportion, harmony—these are always of prime consideration."

From the practical standpoint also, is printing of value as a school subject, because it teaches an unusually good trade. Printing, is in

volume, the sixth largest industry in this country, and besides it is one of the best paid of all the vocations. Success in any line of business is made greater by even a limited knowledge of the art of printing which "touches and really dominates the business world."

Printing in the schools, however, does not mean that the young apprentices are the only ones to benefit by it. The trade itself will certainly receive a stimulus to better things as a result of a demand for them. This demand, in turn, will be the direct result of printing in the schools, for while many of the boys are being trained into future printers, all of them are being trained into future buyers and users of printed matter.

A MANUAL TRAINING EXPERIMENT IN ENGLAND

Professor Dr. J. J. Findlay of Manchester University, believing that influences from many quarters are leading men to a more personal handling of educational reform than has hitherto obtained, thinks that to live for a time—either at week-ends or in a few weeks of vacation—under camp conditions, in a among country folk, appears to be a good way of getting to understand in one's country settlement where some demand is made for simple industrial activity and own person the meaning of crafts, of domestic activities, even of fine arts and of nature study, as viewed by children.

After being on the lookout for a suitable site whereon to begin operations, he has at last been able to rent about three acres of a farm near Shrigley, some twelve miles south of Manchester, in a pleasant undulating and varied farming district. Not being satisfied that tent life alone would achieve the object in view, sales of old timber were attended and in this way a quantity of timber and roofing were purchased at a low figure. Here it may be mentioned that the second-hand material approaches more nearly the condition of affairs in most schools where material at hand must be used up, very often for purposes very different from those for which the material was originally intended, and, secondly, the burden of the expense at present is entirely upon Mr. Findlay. With a little help and the united efforts of the pupils from the Fielden Practising School and students from the University a large wooden hut has been erected and roofed in. This serves as kitchen and also as a dormitory, a partition separating one from the other. An American stove has been installed for cooking purposes and a lean-to place been added to be used among other purposes, as a dining-room. Already several groups of children, about twenty at a time, have been taken to the Uplands Camp, as it is called, and have spent a profitable week learning by doing. An example of this occurred with some of the boys who were sleeping on hay-stuffed bags in bell tents. They did not realize that they had it in their power to make hay from the grass around them, but they soon learned the process from the neighboring haymakers and then began to cut down the grass, and dry it and stack it and use it for re-stuffing their sleeping bags. If the children are learning, what of the teachers and students? By having problems to

face such as present themselves in great array in a colony such as the professor is establishing, a man or woman may learn from experience the jobs a child is interested in and what appeals to him most at certain ages, also the length of time manual work can be comfortably prolonged, and many of the problems for which we are now awaiting a solution.

At first there were many difficulties to contend with and surrounding farmers feared the destruction of their hedges, etc., but no such thing occurred; the children taken out to the camp had enough to keep them busy and actually living in the country and not being just day trippers, they felt the country was partly theirs, the sense of ownership overcoming any desire to ruthlessly destroy everything they saw—as town boys going into the country for half a day, usually do.

The matter of expense has already been mentioned. Only children whose parents can pay 8s/6d ($2) per week are able to go. The most necessary asset however is the right sort of young enthusiastic teachers who will spend week-ends there and occasionally spend a week with a few of their children there.

On a recent Saturday afternoon eight young schoolmasters were busy removing timber, glass, roofing, etc., to a site which had been chosen for the erection of a joiner's shop. All were hard at work, grimy and toil-stained, when one of His Majesty's Inspectors paid a visit. Instead of "inspecting" in a formal style, the eight laborers were increased to nine—the inspector had his coat off and was soon as busily at work as any.

Of course the Uplands Camp is new and only just begun and it is not being advertised—the professor wants it to grow naturally aided by those men who feel the call. Nevertheless, we, as manual teachers, may well keep our eye on this movement which promises to be full of instruction and guidance in enabling us to tackle the many difficult and intricate questions which confront us.

J. Sanders Arkwright, 25, Chorley Old Rd. Bolton, Lanes.

THE PHILIPPINE EXHIBIT IN SAN FRANCISCO

The schools of the Philippine Islands are to have one of the largest exhibits in the Palace of Educatlon at the Panama-Pacific Exposition. The exhibit will show graphically that public schools are found in every town thruout the Philippines, that they are providing instruction for 500,000 pupils, that the school system is graduated from first grade up to and thru the University of the Philippines, and that industrial and physical training are correlated with the academic work.

Three-fourths of the exhibit will be industrial, because of the economic importance of industrial education to the Filipino, and because the work by its very nature can be more adequately and interestingly exhibited than can academic and physical training work. Each booth will be devoted to one of the more important native industrial materials used in the public schools. The palm booth will be constructed of

materials obtained from Philippine palms; school-made articles, utilizing palm materials, with examples of such materials in the various stages of preparation, will be displayed in this booth. The same principle will be followed in the construction and furnishing of the fern, bambo, and abaca booths. A special booth will be devoted to examples of Philippine needle work.

At former international expositions inaccurate conceptions of the Philippines and of the Filipinos were created by the prominence given to the primitive tribes of the Islands. Particular effort, therefore, has been made by the Bureau of Education to give a correct idea of the Philippines and of the Filipinos which should prove that the Philippine Islands possess inexhaustable natural resources, while the Filipinos, assigned to duty at the exhibit, will undoubtedly destroy many of the erroneous conceptions prevailing in the United States concerning the Filipino people.

KITE-MAKING AND KITE-FLYING AS PLAYGROUND WORK

The following discussion has been received from F. D. Davis, formerly director of manual training at Racine, Wisconsin:

One of the best manual activities adapted to playground work which requires the minimum amount of equipment is kite-work or kite-flying. I found on warm sultry afternoons it was hard to interest boys in strenuous play. The boys were rather inclined to loaf in the shade and do nothing but idle their time away and naturally fall into had habits of talking and thinking and doing. Being as manual arts teacher, I naturally turned to some form of handwork of a simple nature. I chose kite-making and kite-flying. We first made arrangements to find all the material available on the subject. This we found at the public library in boys magazines and in what few books I had myself. We also went to other sources. I was really surprised to know how much had been written on this subject. One of the best series of articles was found in one of the big daily newspapers. I found the boys were very anxious to know all they could, and soon we had quite a supply of material which the boys all read with much interest.

We began first with the old-fashioned tail kite, then we made the bow tailless kite and from that we went to the box kite, in single and tandem. We also made fancy kites of all kinds, and really the boys originated some very novel shapes and designs, but all in accordance with the principles that make kite-flying a possibility.

All the equipment necessary was a sharp jack-knife, home made flour paste, string, small brads, and the sticks which we secured at very small expense, in

many cases split out of old packing boxes. We bought some cloth for the box kites.

All the boys took an intense interest in the making and flying of these kites, even the boys of advanced age, some of the older boys building a box kite over eight feet high, though I would confine myself to the smaller models for general use on account of expense. Every evening when it became cool you could see kites everywhere in the sky. We also attempted some gliders, but owing to my having so many duties we had only a few that really worked sucessfully, I was convinced, however, they could all have been made successful with the proper attention on my part.

The interest soon spread to other playgrounds and we found all the boys of the city playgrounds making kites. This all gave rise to a deeper study among the boys, of the underlying principles of kite-flying, and a broader knowledge of all aircraft. I noticed too that the boys read everything we could obtain on the subject, instead of simply idling away their time.

We formed the boys into squads to build the larger kites, and appointed captains and arranged the closing day for the different squads to hold a tournament when prizes were given for certain performances with kites. I know of nothing better to interest boys than this manual activity on account of the simple equipment, the activity that is required to fly the kites and the research necessary to understand the principles of aircraft.

This was proven by the report of the library where it was said that every book on kite-flying and aviation was out, when heretofore they were practically untouched.

A NEW VOCATIONAL COURSE

The Pulp and Paper Course at the University of Maine is briefly described in a letter from the Bureau of Education, Washington:

The attempts made by higher educational institutions to meet the special industrial needs of the community are illustrated in "The Pulp and Paper Course" lately inaugurated in the University of Maine. The importance of the manufacture of pulp and paper in the industrial life of New England, particularly of Maine, has led the University to establish a four-year course in the subject, leading to the degree of bachelor of science in chemical engineering, in order to fulfil the evident demand for trained specialists in the pulp and paper field.

At least one summer vacation spent at practical work in a mill is required for graduation. The special subjects dealing with pulp and paper manufacturing occupy about one-half the total time of the junior and senior years. They include instruction in forestry as applied to the paper industry, the making of paper pulp, bleaching of pulp, the manufacture of paper, paper coloring, paper testing, paper-mill machinery, cellulose chemistry, and paper problems.

The university has installed special laboratories for the scientific study of pulp and paper manufacture. Neighboring mills have cooperated most heartily,

in some instances even allowing the use of mill equipment for instruction purposes.

Forty students are now taking this work. Last summer 15 of them were employed in paper and pulp mills at from $50 to $80 a month, thus satisfying the requirements of practical mill experience.

SOME VERY SUGGESTIVE OUTLINES

Miss Mary Muldoon's outlines for vocational English, vocational mathematics, and industrial geography (seventh and eighth grade work) should be unusually valuable to those teachers who are interested in these subjects. The outlines appear in full in the *Empire State Vocational Conference Bulletin*. The English work outlined aims to develop in the students the use of clear and correct English and the habit of reading good books. The problems in the mathematical outline are closely related to business and shop conditions. The connection between geographical environment and industrial development are so emphasized in the work outlined for geography that students will have constant opportunity to reason from cause to effect.

The issuing of this bulletin was only possible thru the courtesy of the vocational schoolmen of Buffalo. The printing was done by the boys of the printing department of the Elm Vocational School of Buffalo. The editor of the *Bulletin* is Lewis A. Wilson, State Education Department, Albany, N. Y., the managing editor, W. B. Kampath, of Buffalo.

TRAINING VOCATIONAL COUNSELLORS

In view of the growing interest in the vocational guidance of boys and girls in the public schools and the consequent need of competent trained advisors for this work, the Women's Educational and Industrial Union is offering this year a course for vocational counsellors. It is a full-time course covering an academic year and will be of a distinctly practical nature. Miss Florence M. Jackson, director of the Union's appointment bureau and vocational counsellor for Smith and Wellesley Colleges, will have general supervision of the course, and Dr. Susan M. Kingsbury, professor of economics at Simmons College and director of the department of research at the Women's Educational and In-

dustrial Union, will be in charge of the investigations. Candidates will be chosen according to their fitness for the work. Tuition scholarships will be awarded to a limited number for the first year.

The purpose of the course is to provide a knowledge of industry, of methods of industrial investigation and use of statistics which form the proper foundation for vocational guidance; to supply other training valuable for vocational advisers; and to afford a means for the practical application of principles and methods studied.

The curriculum includes instruction in general and applied psychology, education, economics, statistical methods, and laws relating to child labor. A study will be made of vocational guidance methods in use in the United States and Europe, and opportunity will be afforded for observation and practice in the various commercial and charitable employment agencies in Boston, as well as in the Union's vocational bureau. This work will be supplemented by lectures and discussions upon the theories of vocational guidance. An important part of the training is the direction of industrial and social investigation and the methods of handling and interpreting data.

TRAVELING EXHIBIT OF COMMERCIALLY IMPORTANT WOODS

The Forest Service of the U. S. Department of Agriculture has prepared, for loan to schools, libraries, and other educational institutions, sets of sixty-four samples of commercially important woods of the United States, together with maps showing the region in which each species grows, short statements of their principal uses and physical characteristics, charts and tables showing forest products by states, the rise and fall of the lumber industry and the percentage of lumber supplied by different regions, and maps of the natural forest regions of North America and the National Forests. These exhibitions are placed on mounts measuring 16½″x10″, which, in turn, are fastened to green denim, with eyelets in upper corners for hanging. The whole exhibit covers a wall space about four feet high by thirteen feet long.

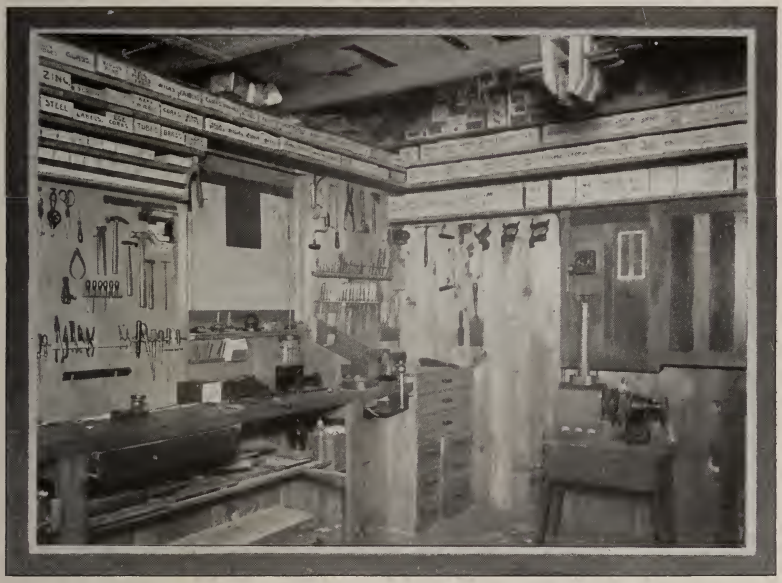
This exhibit is loaned for short periods under agreement with the borrower that he pay transportation charges and forward it promptly to the next place of exhibition at the direction of the Forest Service. The exhibit, wrapped for shipment, weighs about seventeen pounds.

Application for the loan of this exhibit should be made directly to the Forester, U. S. Department of Agriculture, Washington, D. C.

THE DUNKIRK WOODWORKING COMPANY

Ten boys from the eighth grade and high school of Dunkirk, N. Y., have organized the Dunkirk Woodworking Company. They build, crate, and ship automobile repair trucks for a local firm.

Shortly before Christmas the boys made seventy-five sleds for a local department store. The boys and some of these sleds may be seen in the accompanying cut. The boys are now working on orders for cabinet work. This work is all done out of school hours. The company purchases all the material used, and keeps an account in one of the city banks. It elects its own officers and conducts regular business meetings. The superinendent of schools, N. L. Englhardt, the principal of the high school, B. P. Fowler, and the supervisor of manual training, Thomas G. Russell, are directors in the company, but do not participate in the dividends.



A PICTURE STORY

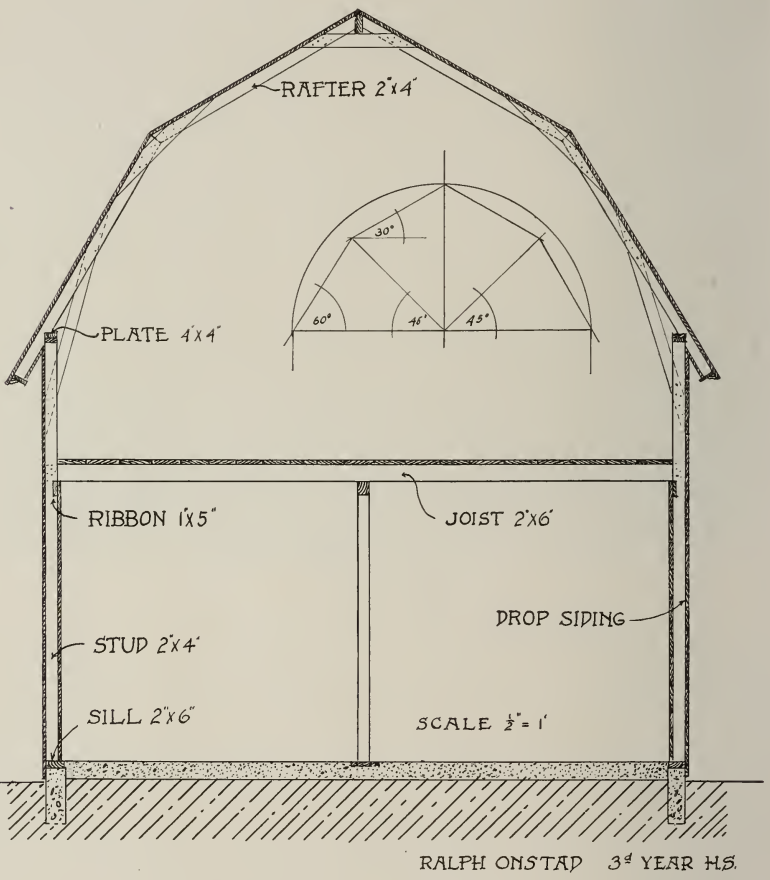
Here is a picture worth framing. It is a story with a moral. How would you like to work in such an orderly shop? Each tool seems to be just where you can most easily put your hand on it when you need it. Look at the different kinds of pliers and wire cutters all in a row at the left, the variety of hammers, the screwdrivers, the files, the saws, and that unique collection of boxes all carefully marked. As you look at the labels you read, "glass, zinc, screws, gear wheels, steel, labels, corks, tubes, long screws, brass, keys, cement," etc., etc. Then look at the lantern the telephone the induction coil and battery, and the case of drawers in the corner.

I suppose you have already reached the conclusion that this shop belongs to some teacher of manual training, but you are mistaken. It is the "recreation center" of a musician—the leader of a symphony orchestra. You might guess he were a musician if you read some of the labels—"cello strings, violin pins, violin bridges, bow supplies," and the like. He is also something of a machinist, an electrician, and a prize winner in amateur photography—what people call a genius because he does so many things and does them so well. But do you suppose he could do so many things and do them well if he did not have the orderly habits that are indicated in the way he keeps his shop?

Happy is the workman who always finds his tools in order.

A SCHOOL BARN AS A SCHOOL PROBLEM

The boys of the West High School of Green Bay, Wis., have recently completed a piece of construction work that deserves commenda-



tion, and we are glad to present to our readers the following account of it written by R. S. Gerganoff, director of manual training and drawing, under whose supervision the work was accomplished:

Our problem the latter part of October was to erect a sanitary barn for the agricultural department of the West High School. It was to house a cow, a horse and a few farming implements used on the school farm. The outside dimensions (18'x30') were given, the time was limited, and so were the funds. It was up

to us to design the building, make the plans and finish the work with the money allowed before the cold weather came.

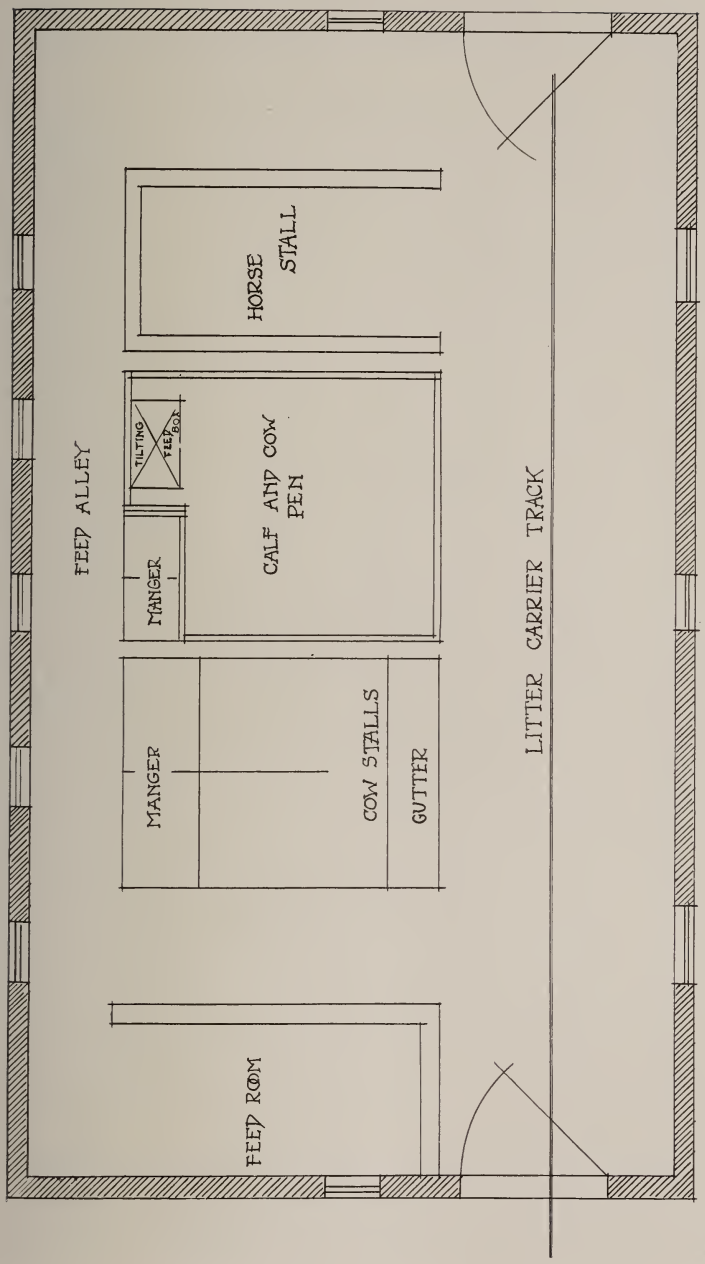
The work was carried on by the second, third and fourth year high school students, taking the regular four years course in manual training and drawing. According to the schedule, the twenty-four sophomores took their work at 8:45 to 10:15; the eighteen juniors at 10:15 to 11:45; and the nine seniors at 1:30 to 3:00.

First of all, after visting some buildings and barns under construction, the boys made all the plans and details of our barn. Then we went to put the theory and book work into practice. We found that to draw geometrical figures and roof constructions on paper with the instruments, and to make the same figures full size with a chalk line and a yard stick on the ground or floor seemed to the boys as two different problems. At this point, to give them practice in applying their geometry and drawing to outside work, each one made geometrical problems as large as twenty to thirty feet on the gymnasium floor or in the school yard. Then we were ready to make square corners for the foundations and to lay out the roof construction full size on the floor. While the work was going on, the boys were asked to figure out individually: how to make the concrete forms so that the lumber would not be wasted; the quickest way of framing and raising the sides of the barn; the best way to cut and put up the rafters, etc.

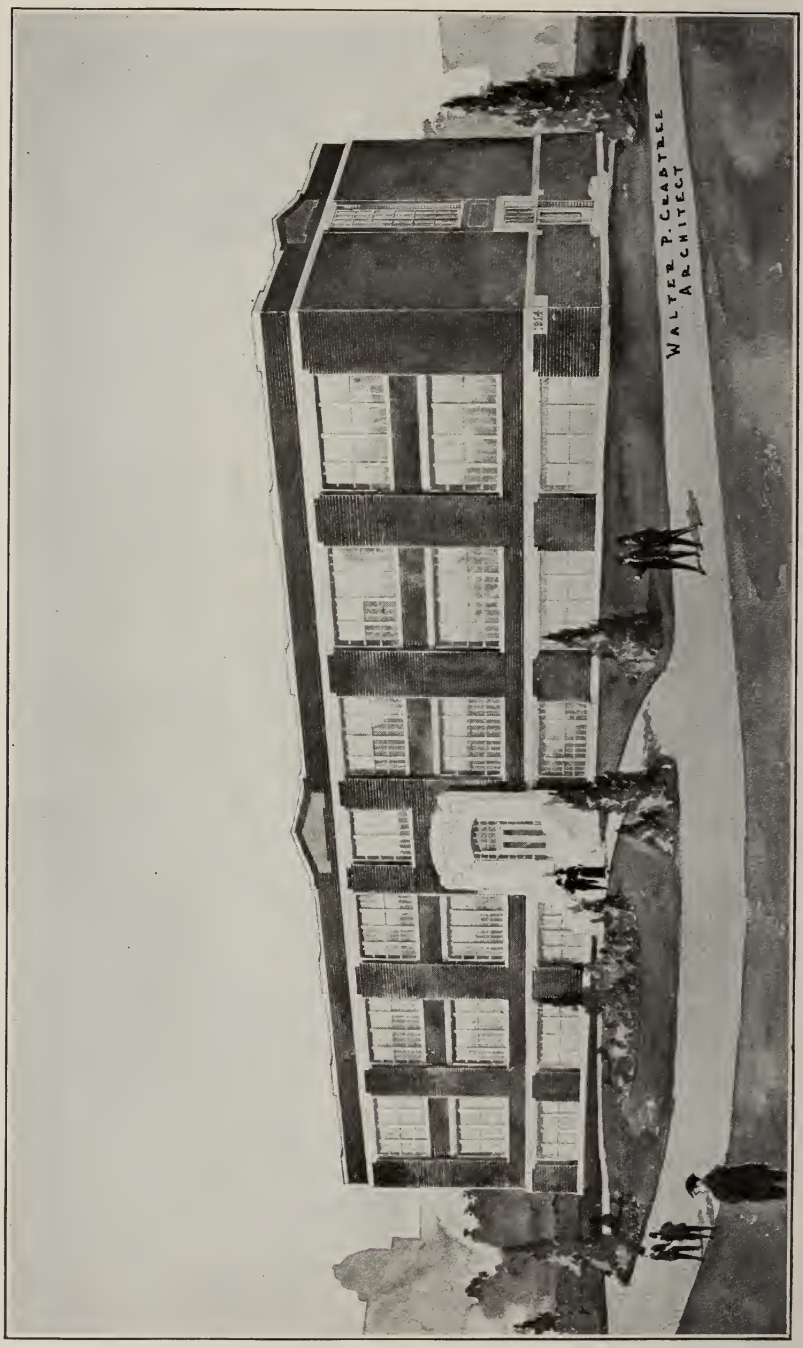
The barn was built near the school so there was no time lost in going to the work. The first class took the tools out and the last brought them in and took care of the lumber left out. Some of the boys that take special work and stay all the morning or afternoon acted as foremen. All were required to have working clothes on. It was also understood that they were to keep in mind the rule used in some shops: "get to work and keep moving, or get out." The instructor did not keep an angelic expression on his face when the work was not done right either. The boys were not coaxed to do the work any more than they would be when working for a contractor. Every one had to be on time and do accurate work. Unnecessary talking, laughing and joking resulted in waste of time and inaccurate work. This method might prove a failure in another community, but with the support of the principal, it was quite efficient in our school.

The barn was finished in five weeks. There was no pay for the boys, since they used their regular time for manual training, and the allowance for material was only $200.

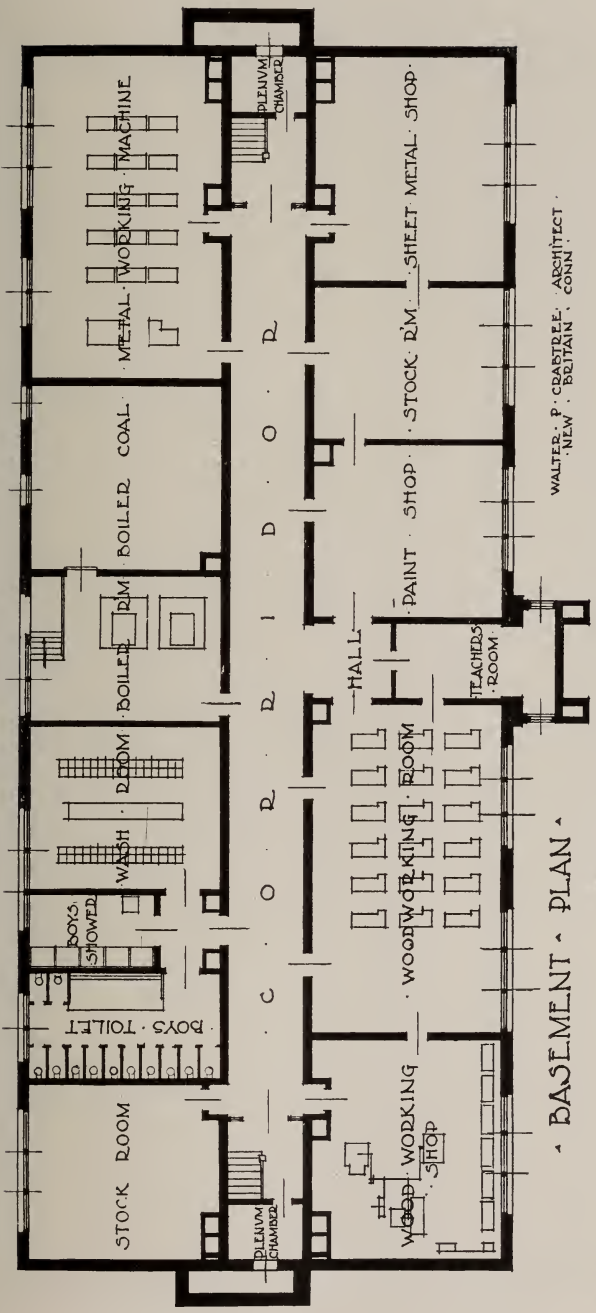
As a whole, the problem was very practical and beneficial to the students. They were not only glad to work outside, but some spent their free periods in helping to build the school barn. It gave them practical knowledge in mixing concrete, framing a building and working according to their own plans. Altho the construction was simple, it gave them a chance to work out the details that they could not understand before. Since the work was finished the boys taking architectural drawing have no trouble in working out more complicated plans and details.



FLOOR PLAN SCALE 1/4" = 1'



PREVOCATIONAL SCHOOL, NEW BRITAIN, CONNECTICUT—NOW IN OPERATION



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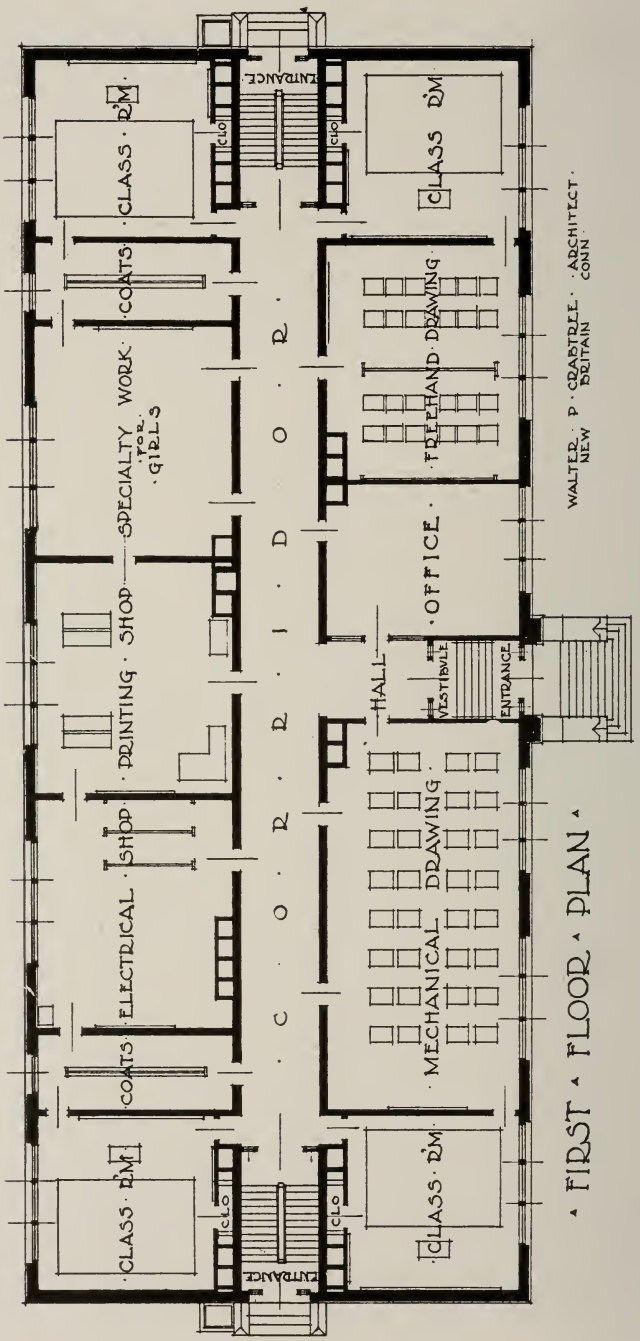

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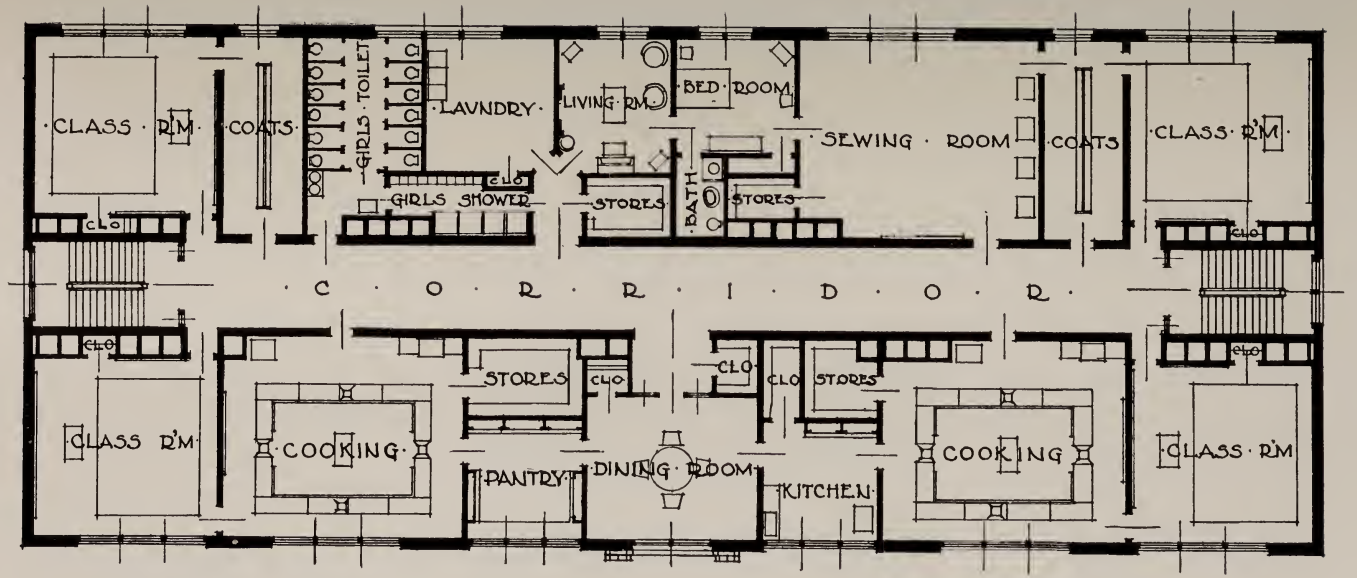


SECOND · FLOOR · PLAN ·

· WALTER · D · CRABTREE · ARCHITECT · NEW · BRITAIN · CONN ·

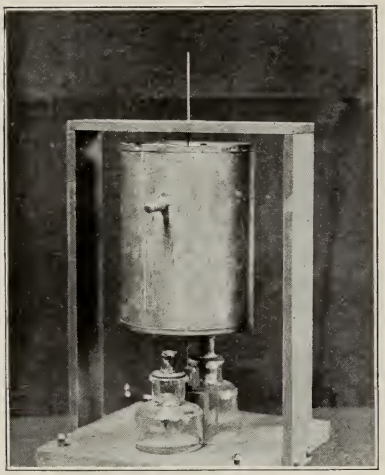
PREVOCATIONAL SCHOOL, NEW BRITAIN, CONNECTICUT

SHOP NOTES AND PROBLEMS

ALBERT F. SIEPERT, Editor

SOME PROBLEMS IN STEAM I[1]

The material presented under this heading is the result of an experiment covering a number of years and in four successive 8th grade classes. Each problem is a successful one both in that it was completed and that it developed the desired speed and power. The projects to be shown in the first four installments have been carried out on the class basis and can be handled in a typically equipped woodworking shop with the addition of a small metalworking outfit, including snips, hand-drill, hack-saw, files, small taps and dies, and blow-pipes to use either alcohol lamps or gas. The problem of fastening two pieces of metal together in making a blow-pipe for gas opens up such a range of possibilities that this has been made a required project. It is a good plan to "jig" as many of the operations as possible in constructing these models as it facilitates their construction and permits a better output. For example, the operation of soldering the shafts to the rotor is made much easier by the use of a block of wood having a hole bored to fit the shaft perpendicular to its surface. Absolute originality is not claimed for each problem, but many are original, and all are new in the form presented here.

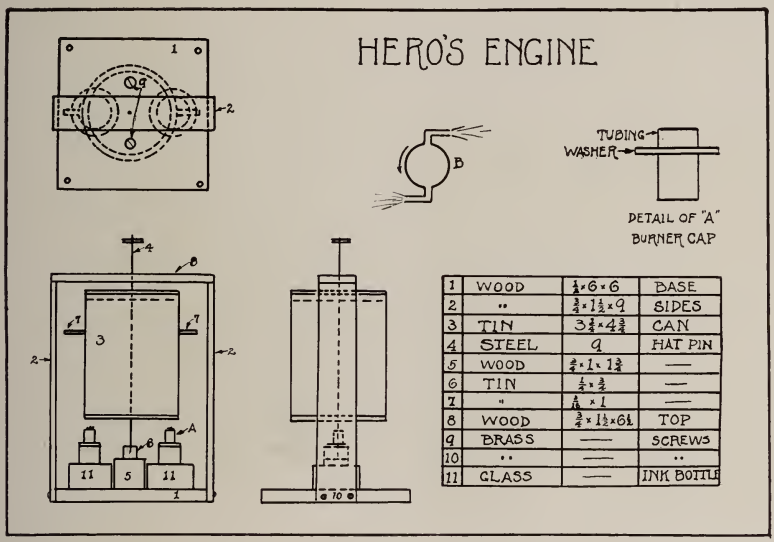


STEAM TURBINES

The projects of the first group are of the turbine type and have the boiler an integral part of the engine. The boilers used for the problems in this issue are friction-lid tin cans such as paint or Karo syrup is sold in.

[1]This contribution is the first of a series having a common center of interest. The facts observed in one case help in the next, and the projects are the result of many applications of a common principle. Only a very simple equipment was required for much of the work, and at all times the use of material was encouraged in which others saw no value. The boys had to meet and solve problems which called for originality and perseverance, while the nature of the projects demanded an accuracy in result and the observance of principles too often neglected by the formal type of problem.

The photograph and drawing illustrate a model of Hero's original steam mechanism which developes considerable speed. The axle is a long hat pin which is put thru two holes punched in the center of the top and bottom of the boiler. The holes must be accurately placed, and are made by means of a marking awl. Allow sufficient height under the boiler for the alcohol lamps when soldering the axle in place. The two short pipes (No. 7), soldered diametrically opposite each other near the top of the boiler, are made from the lead containers furnished with cheap compass sets. These may be purchased very reasonably from the manufacturers. Very small holes are punched in these



1	WOOD	$\frac{1}{4}\times 6\times 6$	BASE
2	"	$\frac{3}{8}\times 1\frac{1}{2}\times 9$	SIDES
3	TIN	$3\frac{3}{4}\times 4\frac{3}{4}$	CAN
4	STEEL	9	HAT PIN
5	WOOD	$\frac{3}{4}\times 1\times 1\frac{3}{4}$	—
6	TIN	$\frac{1}{2}\times\frac{3}{4}$	—
7	"	$\frac{1}{16}\times 1$	—
8	WOOD	$\frac{3}{8}\times 1\frac{1}{2}\times 6\frac{1}{2}$	TOP
9	BRASS	—	SCREWS
10	"	—	"
11	GLASS	—	INK BOTTLE

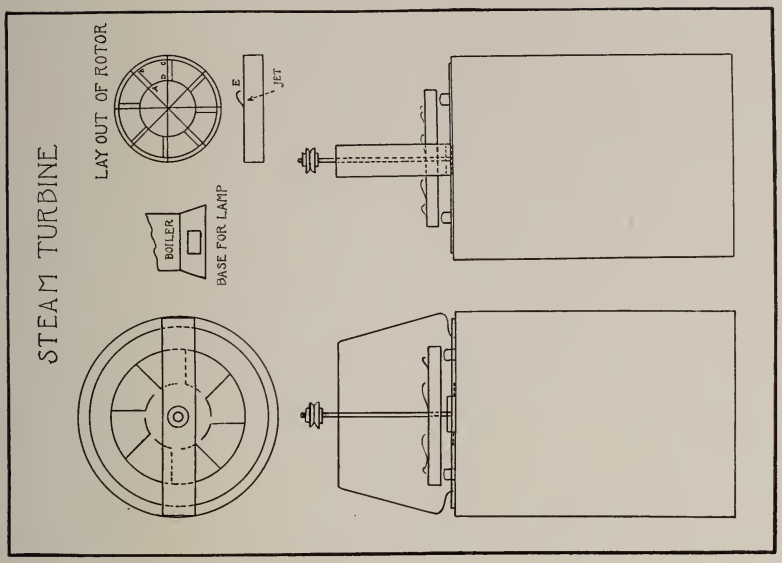
pipes so that when steam is generated it is forced out thru these small holes with sufficient pressure that the back action of the air against the steam jets causes the whole mechanism to revolve (B). Two brass nuts are soldered to the top over holes punched equidistant from the center and diametrically opposite. These holes afford a place thru which to fill the boiler with water, and are closed by means of short round-head machine screws tightened up in the nut with a leather washer under their heads. The construction of the wooden frame is apparent from the photograph and drawing. This model works so well that it developes sufficient speed to throw the water to the outer sides of the boiler by centrifugal action, leaving the bottom bare, which, in turn, permits the solder about the axle to become heated so that it runs off and causes a leak.

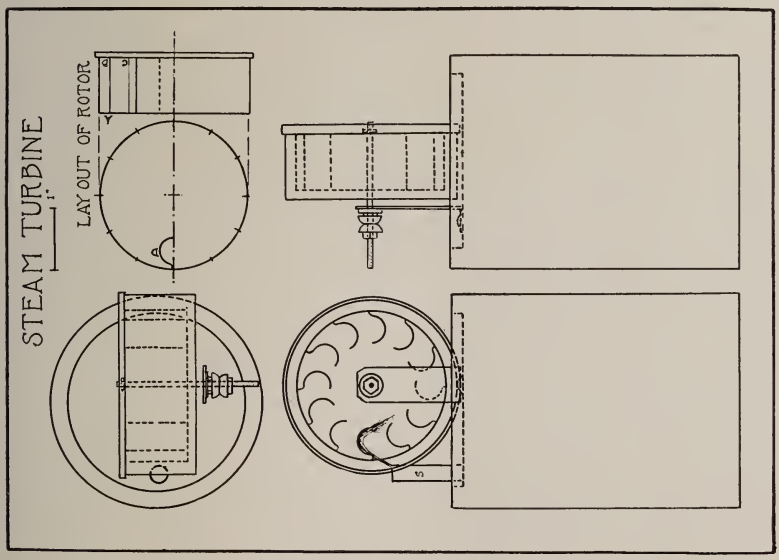
The second photograph shows two turbines made after the Hero model. In the first attempts to use steam pressure it was typical to use the reaction of the air as the source of power, but in the modern turbine motion is caused by impinging the jet of steam on the blade of a revolving part. It may be stated that the larger the angle thru which the jet is bent by means of the blade the greater

will be the power obtained. The following projects make use of the principle of the modern turbine. During the process of selecting materials for these models the boys kept the town ash dumps very well "covered." The model at the left has a case for the rotor, both case and rotor being made of tin cans, the latter fitting inside the former. The case is cut down to about an inch in length and soldered to the lid of the boiler after a hole has been made in the center to form the back bearing of the rotor shaft. The front bearing is made of a strip of copper or brass bent L shape and soldered to the lid. The shaft is a piece of $\frac{1}{8}''$ brass rod threaded at back end for a nut and at front end for a pulley. The most successful pulleys are made of wooden button foundations glued

together as indicated and squeezed up between two nuts. The steam jet comes from a hole punched in a pipe (S) made of lead containers. The jet is bent nearly 180° by the mechanism shown. The rotor is the most difficult part to make. As shown in the drawing it is made of the end of a tin can cut down to an inch in length. Twelve lines (A-B) are laid off on the circle as indicated and cut with a metal snip, the lines (B-C) being cut circumferentially with the point of a knife, after which the loose parts (D) are bent as shown, using round nose pliers. The rotor is now ready to be attached to the shaft. The friction lid of the boiler becomes the safety valve and offers a convenient place to fill it with water.

The third model of this group, shown in the right of the photograph, is a horizontal adaptation of the preceeding idea. The yoke which forms a support for the rotor shaft is a strip of metal bent as indicated in the drawing and soldered to the lid of the boiler. The lower bearing is a similar strip bent and soldered in place. Two jets are provided in this case, using the same lead containers soldered to the lid. Care must be taken to get the nozzles immediately under the vanes and to punch the holes so that the jet of steam strikes the vane



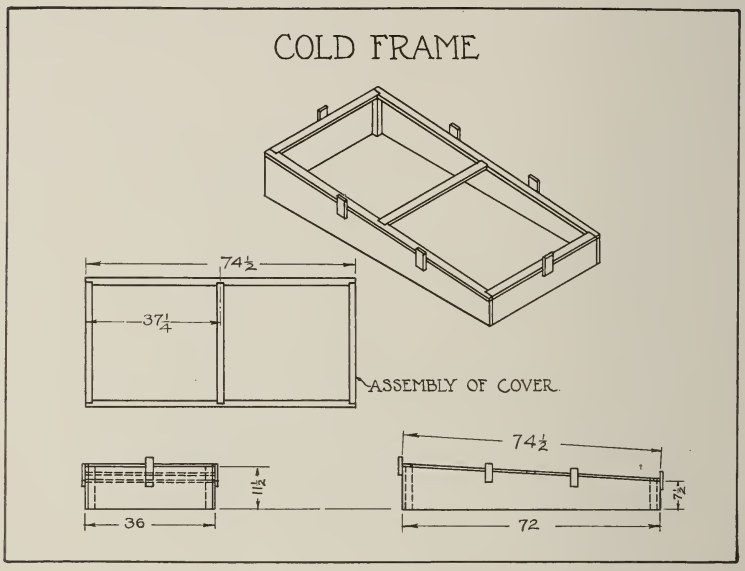


tangent to its curve, as shown at E in the rotor detail. The rotor again is the most difficult feature of this problem. It is made of the end of a tin can cut down so that only ½″ of the cylindrical part remains. The circular part is laid out as shown in detail, and knife cuts are made on lines A-B, B-C and A-D.

The loose part is then bent with round-nose pliers so as to give its section the appearance shown at E. The shaft of 1/8″ brass, is soldered to the rotor using jig mentioned above, and the mechanism is ready for assembly and trial.

The source of heat for these two turbines may be a stove, gas plate or an alcohol lamp built in as part of the boiler as shown in the drawing. In this instance the base is made from a corned beef can.

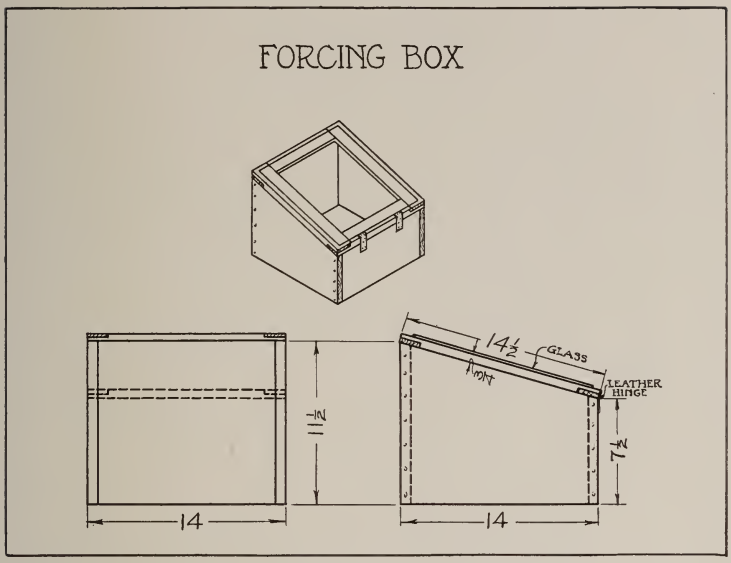
—Fred P. Reagle, Montclair, N. J.



COLD FRAME[2]

This problem may be made of 7/8″ cypress or hard pine. Oiled muslin is intended as a covering material, but if this frame is to be used as a hotbed, a window sash is to be substituted, in which case the size of frame should be suited to the sash available. In making this project the sides are cut to shape and dimensions indicated; the ends are cut next and then the strips for the frame of the muslin covers. Finally the guide blocks and corner posts are made. In assembling, (1) the corner posts are nailed to the inside ends of the side pieces with 8 d finishing nails. (2) The ends are nailed to side boards and corner posts; (3) The guide blocks are nailed at indicated positions; (4) The ends and sides of cover frame are nailed together, after which the middle crosspiece is nailed in place; (5) The muslin is tacked to the cover frame and rubbed with an oiled cloth.

[2]The drawings for these problems were made from material found in a bulletin issued by the Kansas State Agricultural College under the title "Manual Training in Village and Rural Schools," and are presented here thru the courtesy of the author, Geo. E. Bray, of the College Extension Division.

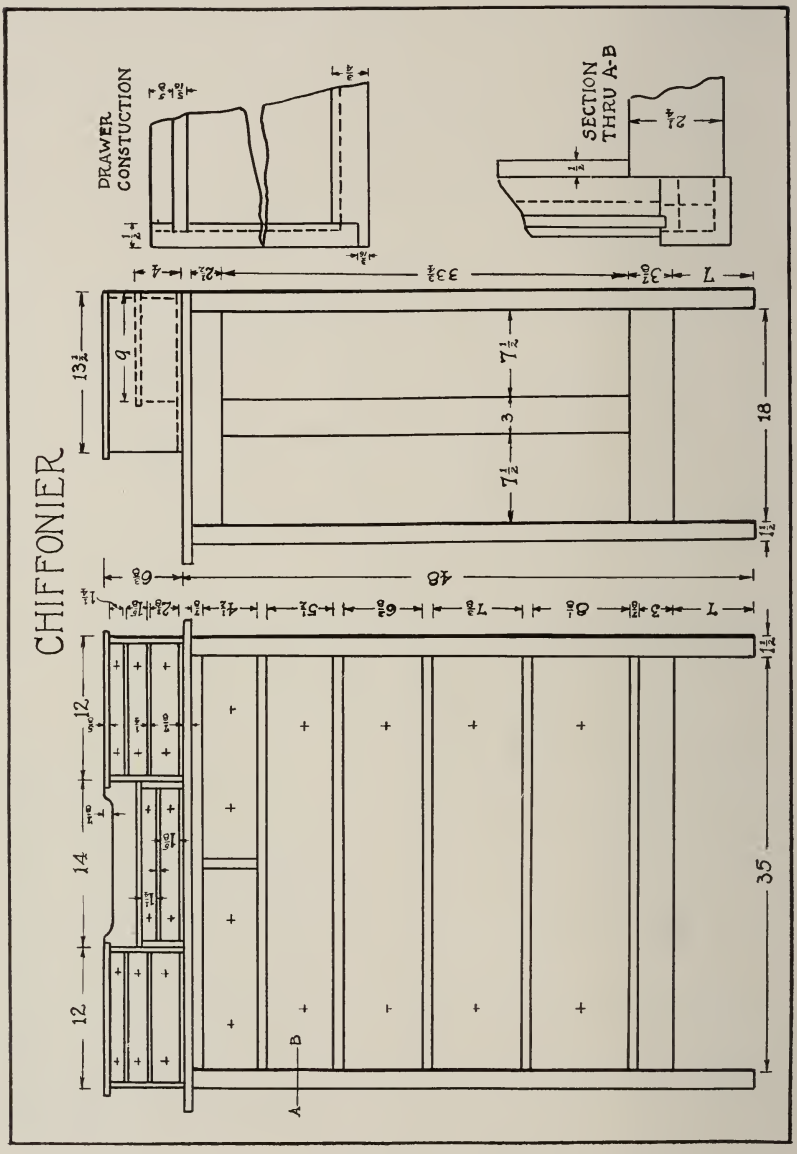


FORCING BOX[2]

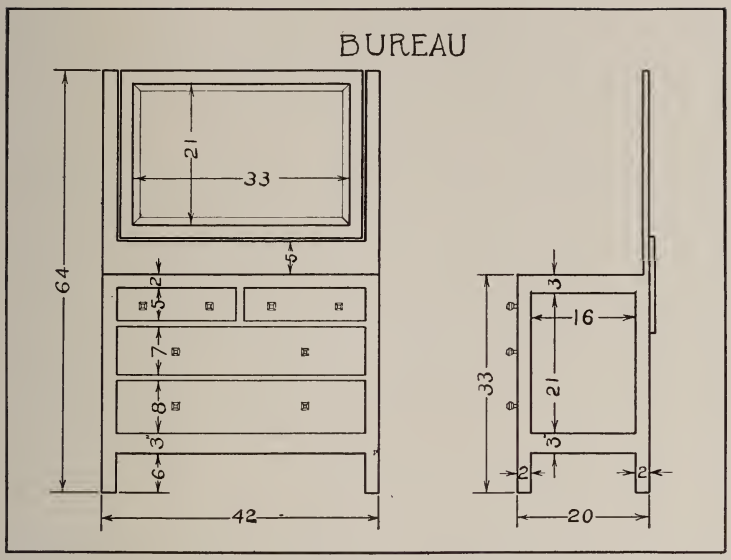
This project is used for forcing the growth of vegetables, such as rhubarb, and may be set in place, one over each plant, late in fall or early in spring. Barnyard fertilizer is placed around the box to prevent freezing and to warm the soil. The box is made of ⅞″ cypress, the upper edges of the end pieces being beveled so the cover fits tightly. The cover is a frame made with a half-lap joint; the glass is held in position on the lid by means of large head carpet tacks.

CHIFFONIER

This piece of furniture offers one of the finest cabinet problems which can be introduced in an advanced course in woodworking involving machine operations. The project requires the following types of work: Glueing, paneling, cabinet making and drawer construction. Craftsmanship methods are emphasized if made as an individual problem, while factory methods are employed if used as a class problem by a group. The photograph shows a chiffonier made of quartered white oak which has been fumed and finished in wax. —Thomas Diamond.



[3]The chiffonier and bureau problems are contributed by Prof. F. D. Crawshaw from the Department of Manual Arts of the University of Wisconsin.



SPECIAL BOX BUREAU CONSTRUCTION

The drawing for a bureau presents a project involving several unusual features in construction details. The drawer sides are provided with friction strips $\frac{5}{8}$″ wide extending from the drawer front to the rear end of the side piece. The side panels are $\frac{3}{8}$″ thick and are set $\frac{1}{8}$″ below the surface of the rail and stiles. The rails are all made from 1″ stock. The design was suggested by a cardboard bureau shown in a previous issue of this magazine.

Birch was used thruout for this project with white enamel as the finish. The first step in finishing was to thorolly sand the outer surface, after which three coats of flat white were applied. Each coat was sanded with No. 00 sandpaper when perfectly dry. This was followed by three coats of enamel, each being rubbed down with pumice stone and water. Rotton stone and water was used for the final polishing, special care being taken at all times with the sharp corners to avoid rubbing thru the enamel.

JAMES T. GREGERSON.

REVIEWS

A Handbook of Vocational Education. By Joseph S. Taylor, district superintendent of schools, New York; published by the Macmillan Company, New York, 1914; 7¾x5 in.; 221 pages; price $1.00.

"The study presented in this volume is intended to show how foreign nations and certain American communities have solved or have tried to solve the problem of vocational education. There is at present no single volume which gives a systematic survey of the general field of vocational education, embodying both the historical and the logical aspects of the subject. A vast body of material has been accumulated, but it lies scattered in magazines and monographs printed in many languages. This handbook is a digest of some of the most important of this literature."

The book not only analyzes the present situation in vocational education, but offers constructive suggestions.

Domestic Science Principles and Application. By Pearl L. Baily; published by the Webb Publishing Company, 1914, illustrated; 4¼x7¼; price $1.00.

This is a text-book for a two-year course in cooking in the public schools. It is tentatively arranged for sixty-four lessons of one and one-half hours each, with suggestions for amplification if the lesson time is longer.

The food principles form the basis for the lessons, which are arranged to deal first with the simpler food materials. The progress to the more complex food combinations is gradual and practical. Portions for an average family are given in each recipe, and for the convenience of the classroom work, the basis for two girls working together is also stated.

The distinctive features of the book include suggestions to teachers on the manner of conducting bread and roll lessons in the short time of a classroom period, suggestions for school lunches and a complete list of equipment for the teaching of a two-year course in domestic science in the public schools.

The General Education Board 1902-1914, written and published by the Board, illustrated; 5¼x8¼ in.; 240 pages.

This book gives an account of the general activities of the Board and a history of its development, since its foundation in 1902. Now that the work of the Board is past the experimental stage and there are tangible results to be discussed, this report has been made as the first of a series that will hereafter be published from time to time.

The chapter headings suggest the wide scope of the work accomplished by this Board—"Farm Demonstration" (one-third of the book), "Secondary Education," "Colleges and Universities," Medical Education," "Rural Education," and "Negro Education." But even more interesting than the bigness of the field are the methods used, and more interesting still and more wonderful, are the results obtained.

Modern Problems of the Home, School and Church Solved by Christian Pedagogy and Sociology. By G. C. H. Hasskarl; published by the author, 1914, and on sale at the General Council Publication House, Philadelphia, Pa.; 5½x7½ in.; 182 pages. Five types of problems are considered: ethical, physical, social, and pedagogical. After the analysis of each of these problems a solution is offered.

Descriptive Geometry. By Gardner C. Anthony and George F. Ashley of Tufts College. D. C. Heath & Co. Boston. 6x7¾ in. oblong; 130 pages and 34 plates of problems.

This is a companion volume to Professor Anthony's books on mechanical drawing, machine drawing and the essentials of gearing, which are so well and so favorably known. Like them it places emphasis on the selection of problems that illustrate principles involved in practical work.

Elements of Drawing. By George F. Blessing and Lewis A. Darling of Cornell University. Published by John Wiley and Sons, New York. 9x6 in.; 193 pages; 150 illustrations.

Like so many other books published in recent years the purpose of this one is to present a course in mechanical drawing for beginning students in engineering and commercial drafting. Among the features of this book we notice the emphasis placed on freehand working, sketches, and the extensive chapter on drafting room practice.

RECEIVED.

The New Country School. By W. K. Tate, State Supervisor of Country Schools for South Carolina. The same pamphlet contains *What the Youth's Companion Has Done for School Inforcement,* by Warren D Foster. Published by the Extension Department, The Youth's Companion, Boston, Mass.

High School Standard Dictionary. Abridged from the New Standard Dictionary. Published by Funk & Wagualls Co., New York, 1915. 80,000 words defined; 1,200 illustrations; 902 pages; price, $1.50, net.

Mechanics for Builders Part II. By E. L. Bates, lecturer at the School of Building, Brixton, London, and Frederick Charlesworth, lecturer at the Southwestern Polytechnic Institute, London. Longmans Green & Co., London and New York, 1914. 5x7¼ in.; 444 pages; price, $1.00, net.

Alternating Currents Simplified. By Elmer E. Burns. The Joseph G. Branch Publishing Co., Chicago, 5¼x7½ in.; 199 pages; price $1.50, net. This book aims to give the electrical worker a clear understanding of the action of an alternating current.

An Introduction to Machine Drawing and Design. By David Allan Low, emeritus professor of engineering, East London College. Longmans, Green & Co., London and New York, 1914. 5x7½ in.; 248 pages; price 75 cents. This is a new, rewritten, reillustrated, and enlarged edition of a well known standard textbook on machine design.

How to do Architectural Drawing. By Oscar S. Teale, architect and instructor at Teachers College, Columbia University, also at Mechanics Institute, New York City. Adams Press, 62 William St. New York City, 1914. 5½x8 in.; 238 pages; price, in flexible binding, $1.65, net. A textbook for the use of students.

Laboratory Exercises in Farm Mechanics for Agricultural High Schools. By Daniels Scoates, professor of agricultural engineering, Mississippi Agricultural and Mechanical College. Farmer's Bulletin No. 638, published by the U. S. Department of Agriculture, Washington, D. C. Outlines exercises in rope work, farm building construction, repairing farm machinery, surveying, irrigation, etc.

Correlating Agriculture with the Public School Subjects in the Southern States. By C. H. Lane and E. A. Miller. Bulletin No. 132 of the U. S. Department of Agriculture, Washington, D. C.

Mechanical Drawing Outlines for High Schools. By George M. Brace. Bulletin No. 55, issued by the Department of Education, State of Minnesota. This is illustrated with fourteen plates of drawings.

Course of Study in Manual Training. Prepared by a committee appointed by the Wisconsin School Arts and Home Economics Association, John Callahan, chairman. Issued by the State Department of Public Instruction, Wisconsin.

North Bennet Street Industrial School, Boston, Mass. Illustrated pamphlet. George C. Greener, director.

Outlines of Lessons, Wisconsin Public Industrial, Commercial, Continuation and Evening Schools. Bulletin No. 10, issued by the Wisconsin State Board of Industrial Education, Madison. A book of 516 pages.

Industrial Conference. Report of a conference held at the Washington Irving High School, New York City, June 29, 1914. Address by John Purroy Mitchell, Charles A. Prosser, Gustave Straubenmiller, William A. Prendergast, H. E. Miles and William Wirt.

Industrial Education. By Dexter S. Kimball, professor of machine design and construction, Cornell University. Published by the University, Ithaca, N. Y.

Report of President of Board of Education, New York City, 1914, gives first attention to vocational training.

MANUAL TRAINING
AND
VOCATIONAL EDUCATION

APRIL, 1915

THE PROTOCOL AND INDUSTRIAL EDUCATION[1]

JULIUS HENRY COHEN

IN its report, the Committee on the Promotion of Unnecessary Litigation of the New York State Bar Association makes the following very pertinent statement:

> Law, like medicine, is of two kinds, preventive and remedial. Law is preventive only when it is constructive, and then only when it is so constructive as to obviate all causes for dispute. It becomes remedial only after a cause for dispute has actually come into existence.

More and more the layman is coming to recognize that the work of the lawyer in the direction of the establishment of machinery to prevent strife is quite as important as the work of the doctor in the fields of sanitation and hygiene.

War in industry—How shall it be prevented? In these days when we seem not to have solved the problem of international relations, when war seems to have become more an inevitable event than ever before, are we justified in looking forward with hope to averting war in industry? This problem confronts our Government. The Commission on Industrial Relations is grappling with it. Meanwhile, agencies are at work in industry that may supply that piece of machinery more valuable than engines of destruction, that preventive hygiene more valuable than the alleviation of physical suffering. Before such an audience, I need not define the term "collective agreement." In England the collective agreement is well known and well understood. In the Report on Collective Agreements between employers and work-people in the United Kingdom, published in 1910, issued by the Board of Trade (Labor Department), Sir George Asquith reports that there were then in existence 1,696 agreements involving 2,400,000 people. In the introduction, Sir George Asquith says:

[1] Address delivered before the Eighth Annual Convention of the National Society for the Promotion of Industrial Education, Richmond, Va., December 11, 1914.

The wide prevalence of these arrangements in our most important industries must have an important influence on industrial enterprise, for when the level of wages, the length of the working day, and other probable conditions of employment are regulated, for specified periods of greater or less duration, by clearly defined agreements, the employers concerned must be enabled to calculate with precision that part of the cost of production which will be represented by labor; however, when these agreements bind the whole or a very large proportion of the firms engaged in a given trade, the danger of undercutting by rivals who find it possible to obtain labor at a lower price is materially reduced.

In the more recent report of the Industrial Council on its "Enquiry into Industrial Agreements," dated 1913, the council says:

18. The value of efficient organization on the part of employers and work-people as a means of securing the due fulfilment of industrial agreements is very clearly demonstrated by the experience of the different trades of the country.

29. The desirability of maintaining the principle of collective bargaining —which has become so important a constituent in the industrial life of this country—*cannot be called into question,* and we regard it as axiomatic that nothing should be done that would lead to the abandonment of a method of adjusting the relationships between employers and work-people which has proved so mutually advantageous thruout most of the trades of the country.

What is there that gives the term "protocol" the meaning it has acquired thruout the country, as applied to the needleworking industries in New York? To those who have carefully studied the nature of these protocols, to those who have read Bulletins 98, 145, and 146 of the Labor Department, no explanation is necessary. In this address it would be obviously impossible to go into the details so adequately outlined in these government reports. But the striking features of the collective agreements in the needleworking industries can be briefly stated.

The first significant feature is that these agreements accept as a principle the thought underlying the treaties of peace recently negotiated by our country with the Netherlands, France, England, Spain, China, Italy, Denmark, Switzerland, Persia, and many other nations; that is to say, there shall be no war until there is an investigation into the facts. These international protocols contain the significant provision:

The High Contracting Parties agree that all disputes between them, of every nature whatsoever, to the settlement of which previous arbitration treaties or agreements do not apply in their terms or are not applied in fact, shall, when diplomatic methods of adjustment have failed, be referred for investigation and report to a permanent international Commission, and they agree not to declare war or begin hostilities during such investigation and before the report is submitted.

The next striking feature of the garment makers' protocols is that the agreements are without terms. In theory, they can be terminated at any point, at the option of either party. Yet in fact, as was strikingly illustrated a year ago, the agreement can not be terminated so abruptly. The public will not permit it to be terminated so long as there is any other possible solution for existing difficulties. We have, therefore, an agreement without term, concreted and held together by the strongest force in the universe, namely, the moral purpose of a whole community. In other words, these agreements are no longer agreements merely between the parties to the agreement, but have demonstrated their public value to such a degree that the public insists that neither party shall recklessly or heedlessly destroy them. This means that that party guilty of bad faith must answer at the bar of public opinion. Therefore, each of the parties is put upon its sacred honor, and makes its record such that it need not fear the light of day.

ADMINISTRATIVE FEATURES OF THE PROTOCOL

But more significant in its unique features is the creation of machinery by which the difficulties of an industry are met, with an ever increasing opportunity for broadening powers. There is, first, the Board of Arbitration, consisting of the representative of the public (the appointee of both sides), and the appointee of each side. Then there is the Board of Sanitary Control, in which there are representatives of the employers, the workers, and the public. To those who have followed the work of the Board of Sanitary Control, I need only quote the remarks of the present head of our Health Department in New York City:

> How well this organization has succeeded in its work can best be judged by those who have followed from time to time the published reports of its work. Certainly the results have been extremely gratifying. Perhaps the most important progress made has been in the education of both workers and employers. In fact, the main difference between the method of inspection and administration as adopted by the Board of Sanitary Control and as conducted by State Labor Departments lies in the fact that the former have entirely abolished *police* and *detective* inspection. The object has not been to catch the manufacturer in a violation of the law or of the Board's regulation, or to force sanitation upon an unwilling and unsympathetic object of official attention, but to make employers and workers recognize the fact that sanitary standards are beneficial to both.

Then there is the Board of Grievances, the council in which both sides are represented, before which come all important questions for

decision, whose duty it is to decide, in the first instance, questions of "protocol law," and in the next, questions of legislation. Then there is the system of clerks,—chief clerks for both sides, and their deputies, and the new division known as the "Committee on Immediate Action," which combines the function of the jury in determining disputed questions of fact, with the diplomatic service of A B C mediators. In the dress and waist industry, in addition thereto, is the Wage Scale Board, to which is committed the problem of investigating and ascertaining the facts with regard to wages and earnings, and which has power from time to time to recommend changes in standards. Is it not a long step forward from the days of the strike and the lockout to the days when a decision upon the question of a wage increase is based upon a scientific statistical study of the facts, made at the expense of both parties and under their joint supervision?

It is not too much to say, therefore, that in this particular form of collective agreement which we call the protocol are to be found all of the essential elements of

(a) A fundamental constitution,
(b) A supreme judicial tribunal,
(c) A conciliation and mediation department,
(d) A legislative department,
(e) An administrative department,
(f) A law-enforcing department,
(g) A scientific investigating department.

All of these are under the general control of the employers, thru their employers associations, and the workers, thru their Union. In his work on "American Snydicalism," John Graham Brooks offers the following remedy for the solution of the large social problem:

——— the open, declared purpose to admit labor to management, first at safe and possible points, with all that this means of banished secrets; to admit it fearlessly and with no reserves, as far as labor proves its fitness; we then and there connect ourselves with the cooperative regime. This does not close the fist, it opens the arms. It is the essence of this cooperative intention not to exclude, but to include labor in the control of business; courageously to give it every opportunity of training to this end. It will require the severe schooling of a century—but every strong man who openly sets his face that way, who tries consentingly and forebearingly to prove the policy wise, is the helper to whom we look.

Is labor prepared for its participation in the management of industry? Is its organization in shape to play the important part it must play under a system of industrial administration of the kind we have described.

Has it the vision, the far-sighted, constructive genius, the legislative ability, the scientific habit? Have employers the broadness of vision and far-sightedness to understand? These are the troublesome questions that beset the good ship "Protocol" on the high seas, and the crew has many hours of anxious watching while the vessel travels thru the fogs and past the icebergs. As one who has been on deck, may I suggest that the great big problem of the hour is—How can the national movement for efficiency and economy be united with the national movement for democracy in industry? How can the discipline and efficiency of the shop be maintained, yet the workers be granted a larger share in the management of industry? No greater problem faces this or any other country at the moment, tho it may be overshadowed for the time being by the smoke of the battlefield and the thin, small voice "be hushed in the noise of the drums."

THE PRINCIPLE OF COLLECTIVE BARGAINING

Now there are many encouraging signs. In the first place, the trades unionist is committed to the method of collective bargaining. In the next, the manufacturers' associations—at least those in the needleworking industries—are committed to the same principle. Upon no other platform at present can these parties be united. It is sometimes assumed that the socialists of the country are not in accord with this platform, but the activity of such leading socialists as Morris Hillquit and Meyer London (Congressman-elect) in this work is sufficient assurance that so far as the fundamental principles are concerned, they find no inconsistency in their positions. In the next place, altho this may have been questioned in the past, it is encouraging to note that the socialist does not fail to recognize the importance of the differences in skill and qualifications existing among workers. It is a great injustice to the leaders of the Socialist movement of the country to assume that they desire to reduce all of the workers to the same dead level of equality. On the contrary, the utterance of their leaders is quite the reverse. In his work on "Socialism Summed Up," Morris Hillquit says:

> Socialism admits of reasonable variations in the scale of compensation based on the conventional distinctions of effort, skill, and ability. The oft-expressed fear that a Socialist system of production would destroy personal ambition and deprive the individual of an incentive to put forth his best efforts, is based on a confusion between the crude communism which preaches community of goods and equality of reward, and Socialism, which has not the remotest kinship with it.

We have, then, a platform upon which the warring elements may be brought together for the purpose of meeting the day-to-day problems of an industry. This does not mean Utopia. There will be conflict of ideas; there will be frequent battles of ideas, and they will not be settled without many anxious hours; but I believe they will be settled.

There are many indications of lines along which the solution of the future problems of industry will lie, and perhaps the most encouraging of all signs of the times is in the new relationship that has already been established between the National Society for the Promotion of Industrial Education and the parties to the Protocol in the dress and waist industry. Here is presented an opportunity for extending into the educational field the principle of joint management with the advantage of the direct touch and knowledge and sympathy of both sides, and the aid of the educational expert. You have come to us open-handed, offering to aid us in this great problem,—may I say the greatest problem of industrial education? You have made a careful survey of the industry. You have worked out a definite plan of such comprehensiveness and value that the Government itself has taken it and made it part of one of its important bulletins. This you have done with a view to preparing the girls in the largest industry in the country—perhaps in the world—where girls are employed, to become better fitted for their place in life, to open up avenues of vocational progress for them. It is but a week ago that I attended a conference at your office, at which this plan was fully and frankly discussed, yet with a sympathetic interest on the part of the small committee from each side that I am sure must have encouraged the representatives of your association. Of course, we must go slowly. The industrial school under the management of the Society and the Union and the Employers' Association has not yet been erected; the faculty has not yet been engaged; the classes are not yet in session. Still, less than five lines of writing created the Board of Sanitary Control and wonderful institutions, now living facts, resulted therefrom. We would be lacking in human emotion if we did not seek to put them into immediate living form; but the lesson that the wise statesmen of the generations have learned is the lesson of infinite patience, slow development of ideas. The farmer knows what it means to sow his seed and wait patiently for his crop. The doctor knows what it means to wait patiently until the invalid reaches the point where strong food and drink may be administered. The trained legislator knows when to broach the perfect scheme and when to broach the thing that only approximates the ideal.

So, with the dream of your Society for an industrial school in the dress and waist industry in New York, I beg that you will pursue not exactly a policy of watchful waiting, but a policy that encourages, that elucidates, that educates. It may take months before it will bear fruit, but in the long run such a policy makes for greater success. The principle underlying the plan is sound—a joint control of industrial education in an industry in which the educator, worker, and employer participate—as sound as the principal of arbitration, as sound as the principle of joint sanitary control, as sound as the principle of mediation, as sound as the principle of constructive legislation. Based upon knowledge of the facts, this principle must sooner or later take shape, and when it does take shape, to your Society must go the credit for having performed the great service of initiative.

LIBERAL TO THE VERGE OF EXTRAVAGANCE IN MEETING THE EDUCATIONAL NEEDS OF THE FORTUNATE MINORITY WHOSE PARENTS ARE IN EASY CIRCUMSTANCES, WE OWE NO LESS TO EVERY CHILD OF THE TENEMENTS, THE FACTORY AND THE FARM, AND TO EVERY ADULT WHOSE EARLY ENVIRONMENT HAS BEEN ADVERSE, OR WHO BY ECONOMIC CONDITIONS HAS BEEN OBLIGED TO GIVE TO MANUAL LABOR THE YEARS OF CHILDHOOD WHICH SHOULD HAVE BEEN SACRED TO MENTAL AND PHYSICAL PREPARATION FOR CIVIC USEFULNESS AND VOCATIONAL SUCCESS.—David I. Walsh.

THE ANALYSIS OF AN OCCUPATION

M. E. Haggerty

SKILL in any occupation means the readiness to act with speed and accuracy in the situations which that occupation presents. It is of the nature of an occupation again and again to present situations calling for a definite kind of behavior. A board to be squared, a nail to be driven, a surface to be planed, an appendix to be removed, a speech to be made, a bridge to be built, a child to be taught—these are not unique but oft-repeated situations in the vocations in which they occur. If they are to be met with skill, the carpenter, the surgeon, the engineer, the teacher, must behave quickly and accurately, must do without waiting to learn how, must rely upon already acquired modes of activity. The possession of skill thus becomes the possession of habits, and the psychology of skill is the psychology of habit. Evidently the skill of the engineer is not the skill of the teacher, and the ability to saw a board does not equip a man with skill to saw a living bone. The group of habits which constitutes a man a metalworker are not the same as those demanded by the practice of law or the editing of a newspaper. Each particular occupation has its own peculiar skill, a compex group of habits not found in the same alliance and combination in any other field. If we are to understand the psychology of an occupation, therefore, we must gain an insight into the unique group of habits demanded in the pursuit of that occupation. We must unravel and dissect, and disentangle from the complex behavior of the worker the essential facts, principles, and laws according to which that behavior occurs. Such study and investigation may be adequately described as the analysis of an occupation.

For the past several years I have attempted to present this subject to my students in the psychology of efficiency. In order to give them concrete material to work upon I have set them the problem of driving a shingle nail into a board. This experiment has the advantage of demanding little laboratory equipment and at the same time approximating an actual task in a common trade. In general the instruction has been to see how many nails could be driven in one minute. In detail the task has been to analyze the movements to be made and to learn to make each movement in the most efficient way. Analytically the driving of a nail separates into two groups of movements, the movement of the hand

holding the nail and the movements of the hand holding the hammer. To pick up a nail is not a simple act. It involves the contraction of a number of muscles in finger, arm, and shoulder. The chief motions are moving the hand to the nail, grasping it with the fingers, turning the point down, carrying it to the wood, and holding it in place. With the other hand the important thing is the stroke by which the nail is set. Then follow the one, two, three, or four strokes by which the nail is driven into the wood.

The average subject in the test will make many inaccurate and useless movements. There is a best way to pick up the nail, a best way to turn the point down, a best way to hold it when it is being set. There is a best strength of blow in setting the nail and a proper number of strokes in driving the nail into the wood. If any one of these movements is not made in that best way, there is consequent loss of time and a decreased efficiency. Not only must each hand make its proper movement, but the two hands must work at the same time. The one hand must be getting one nail ready while the other hand is driving the one just set, which is no easy matter when the movements to be performed are so diverse.

Just what the necessary movements are and just how they should be performed depend in part upon the mechanical conditions of the task. The kind of nail, the quality of the wood, the shape, weight, and condition of the hammer, the location of the nails, the height of the board, are immediate conditions which facilitate or retard the efficiency of the work. To understand what these movements are or should be, and to see clearly just how every mechanical or other condition modifies the results of effort, that is to analyze the task in a helpful way.

DEMONSTRABLE RESULTS OF ANALYSIS

That proper attention to the analysis of such a task as nail driving and the adequate training of the driver will greatly increase the individual's output is perfectly easy of demonstration. The normal number of nails (shingle nails) driven in these experiments by untrained students is twenty per minute. It is perfectly easy with instruction to increase this output 25 per cent and an increase in ability of 35 per cent to 45 per cent is common. One man, with experience as a carpenter, drove twenty-seven nails per minute in his initial tests. With instruction he came to drive forty-one nails, an increase above his already high record of over 50 per cent.

This increase of ability should not be charged to mere "practice effect." The results of practice come much more slowly after long continued repetitions. The increase in this case comes at once by the introduction of new methods of work. *The analysis of the task* serves to show what movements are necessary, and reveals the most expeditious way of making them. As a result the unnecessary steps are eliminated with a consequent shortening of the time required for driving a nail. Before training, the subject uses habits which he has acquired by *undirected* experience, habits which in most cases he has fallen into by accident. *After analysis all the movements are determined by the actual demands of the task. Taken together, they constitute a scientifically determined set of activties.*

The results of such an analysis appear even more clearly when stated in terms of cost of production. In the Brown-Smith Storage Battery factory one of the important operations is the "trimming of grids." The average work for a single man trimming a "Type E grid" was 45 per day. The manager of the plant, in order to meet the competition of larger factories, set to work to increase the output. He analyzed the trimming operation into five separate processes. Then each of these processes was subdivided into numerous sub-processes and written instructions for doing the work were made out. The workmen were then trained in the new way. As a result the average day's work was increased from 45 to 90 grids. The cost at the same time was reduced from $1.05 to $.53 per hundred for the trimming process.

Numerous cases of increased efficiency due in part to task analysis are now available. Gilbreth secured a performance of 350 bricks per hour from bricklayers when the average mechanic had been laying 120 bricks per hour. Taylor's now famous pig-iron handler loaded 47½ tons of iron after instruction when the gang was loading on the average 12½ tons per man per day. Taylor cites the case where it was possible to reduce the number of laborers engaged in a certain occupation from 600 to 140. In the Eli Lilly Pharmaceutical plant thirteen girls were employed in gelatin-coating pills. A motion study was made, machines were altered and seven girls were trained to do the work. At the same time the hours were reduced from ten to eight and one-half and nine hours per day. In the same plant one porter was able, after study, to do the work three had been doing previously.

Frederick Parkhurst in writing of the analysis of tasks in the Ferracute Machine Works notes almost unbelievable economies as the

result of proper standardization of operations. "A ram which formerly took 33.8 hours to finish complete, is now processed in 6.5 hours; the time on another and larger ram has been reduced from 36 to 8.7. One type of machine formerly averaging over 1,400 hours, is now built in a little more than 300 hours." Mr. Parkhurst gives an extended table covering 259 pieces of work in which *the increase of production is* 240 per cent, and asserts that this was accompanied by "an almost negligible expenditure for tools or jigs or other equipment." It was due to the "standardization of methods and times," the analysis of the task. In another place Mr. Parkhurst gives a table showing the difference in the labor cost under the old way and after the analysis and readjustment. Two hundred and seventy-five different machine parts are considered. Under the old way, the making of these 275 parts required 4,280 hours at a cost of $973.80. After the standardization was made the pieces were produced in 1625.065 hours at a cost of $452.42. This latter cost included a considerable increase in wages paid per hour under the new system and an increase of overhead expenses due to the establishment of the planning department. At that the new labor cost was but 47 per cent of the old cost.

TWO ASPECTS OF THE PROBLEM

The proper analysis of any occupation easily assumes two aspects, that which is chiefly concerned with the instrument, machine, or materials to be used, and that which has to do with the activities of the individual himself. I set two students to work on the increase of efficiency in typewriting. They were at once confronted with the question, does the standard machine properly distribute the movements between the two hands? No enlightenment was found in the literature at hand and it was necessary to determine the matter by experiment. One thousand lines of printed matter were gathered from divers sources, including scientific treatises, editorials, letters, school readers, magazines, and newspapers. The keyboard on the typewriter was divided by a line between 5-*t*-*g*-*b* on the left hand and 6-*y*-*h*-*n* on the right hand. The material was then studied to see if in the writing of the one thousand lines each hand struck approximately the same number of keys. It was found that the left hand would strike 21,301 keys and the right hand 16,055, a difference of 5,246 keys, approximately one-third more work for the left hand. This advantage for the right hand held, moreover, in every selection studied.

The striking of the keys, however, does not constitute the whole of the work of the hands in typewriting. There are, besides, the shifting of the platen cylinder, shifting for capitals, and the striking of the space bar. A proper distribution of the movements here involved might give a better ambidextral equation. In order to determine this it was first necessary to evaluate each of these movements in terms of keystriking. This was done by time and motion studies, and it was found that striking the space bar and shifting for capitals were each the equivalent of striking a letter, and that shifting the platen cylinder required as much time as striking three letters.

Giving each of these movements its proper value, and redistributing the work, it was found that the most balanced distribution was to have the platen cylinder shifted with the left hand and the space bar and capital shift operated with the right hand. By this method the difference between the work of the right and left hands was less than 500 in a total of over 48,000 strokes. Any other arrangement would produce a difference of more than 2,000 strokes. The best arrangement possible with a right-hand shift of platen cylinders was a difference of more than 4,000 strokes. That is, on a machine on which the platen shifting was done with the right hand, the best arrangement that could be made caused the right hand to do approximately one-twelfth more work than the left hand. An interesting fact that we later learned was that all the recent speed contests have been won by machines provided with a left-hand platen shifting device.

In how far the success of the left-hand shifting machines was due to the more equal distribution between the two hands, it is, of course, impossible to say on the basis of this study alone. It seems probable, however, that for high speed work a difference of one-twelfth between the work done by the right and left hands might be important. For slower work such a difference might not greatly matter, but there is undoubtedly a degree of difference between the work of the two hands which could not be exceeded without seriously affecting the output of the machine. Just what this difference is cannot be determined without elaborate experiment.

A COMPLEX OF HABITS

When once the best machine is selected the operator must meet it with a whole system of specific and detailed habits. Let the task be the

copying of a manuscript. The operator must have the habit of seeing the letter *a* and an instant later striking the *a* key on the machine. Such behavior may be described as the *a*-habit. There are then at least 26 letter habits, a dozen punctuation habits, besides several symbol habits. But to write *a* after *n* is a different act from writing *a* after *c,* and to write m-a-n is a different performance from writing m-e-n. There arise thus a set of habits concerned with the writing of certain letters in succession. These habits we may call *word habits,* in like manner there arise phrase habits, *sentence* habits, *discourse* habits, *prose* habits, *punctuation* habits, *tabulation* habits, *capitalization* habits, and many others. Besides these, there are numerous habits involved in putting the paper into the machine, shifting the platen, placing the copy at the proper position, and removing the written sheet. The whole array of habits is so great and so complicated that very few persons ever achieve a high degree of skill in using a machine. The expert operator is a complex of such specific habits properly adjusted to each other.

This study is by no means complete; nor will it be complete when we have worked out all of the specific habits and determined their most efficient mode of functioning. Back of these are the more general habits, habits of attention, habits of suggestion, habits of response to competition, emotional habits, liability to fatigue, and habits of rest—a great background against which the more specific habits must have their setting. To discover all of these facts and properly to evaluate them is what is meant by the analysis of an occupation. When we have done this for the process of typewriting, and then have further learned how adequately to train men and women to perform the task, we shall be in a position to produce typewriting experts in far greater numbers than we are now doing.

VARYING DEGREES OF COMPLEXITY

The analysis of industrial operations is comparatively simple in contrast to the far more intricate habits involved in such occupations as surgery and engineering. A man becomes ill and calls a physician. What habits of mind and body must that physician have in order to meet the situation? Habits in this case are largely mental and take the form of knowledge. To rephrase our question, what must the physician know and what must he be able to do in order to deal adequately with the sick man? Clearly, he must know anatomy with the whole group of histological facts implied. Likewise he must know the functions of all

the structures, their processes in health and disease, he must know the symptoms and the processes of disease and be able to locate with microscope and test tube the cause of disease. He must know the effect of particular drugs and the values of surgery in this particular case. In addition he must have the skill and courage to apply the needed remedy. The knowledge that he must have is represented by the great basic sciences of physics and chemistry, biology and psychology, anatomy and physiology, and the special sciences of pathology and pharmacology, and the whole array of facts included under medicine, surgery, and therapeutics. Moreover, in difficult situations, he must possess the habits of study and investigation engendered by the pursuit of scientific studies. Disease presents itself in new situations and no mere "dose-book" is adequate. There must be skill in research so that new and unwonted illnesses will be properly diagnosed and treated.

Now each bit of scientific knowledge and each bit of expert skill exists in the physician as a habit which he has acquired. He, like the typewriter, is a complicated machine, the parts of which are the unit habits built into his structure and behavior thru experience. Some habits, such as those concerned in speech, or those concerned in eating, the two possess in common. Others are the possession of one alone. Think for instance, of the group of habits connected with using the microscope, or the group concerned in chemical analysis, or that more complicated group concerned in mental diagnosis. The fact that in the case of the physician the habits are many times more numerous and that their arrangement is bafflingly complex does not, however, remove the physician from the sphere of psychological analysis or render his vocation inscrutable. To the psychologist, the physician, the engineer, the typewriter, the lawyer, the workman,the financier, the teacher, the ape, the amoeba and the angleworm are behaving organisms. Whatever may be the difficulties of technic, each is subject to study by the methods of scientific analysis, and we will understand each of these several organisms only in so far as an adequate analysis of its behavior is made. If the physician is to understand the sick man he must figuratively shatter his organism into a million parts and a million dynamic forces. In like manner if the psychologist is to understand the physician he must fragment and subdivide and analyze the physician's total behavior into its elements.

To view the matter in another way we may say that every occupation is constituted by the habits, skills, knowledges, and so on, possessed and practiced by the persons engaged in that occupation. Thus the oc-

cupation of engineering is psychologically nothing more than the sum total of the acts of the engineer, and if we could get an adequate statement of these acts, we would have a scientific description of that occupation. So also of carpentering, and plumbing, of preaching and practicing law, of guiding an automobile and ruling a city. It is what a man does and thinks in his pursuit of any one of these occupations that make up the psychological facts of the occupation in question. To understand the occupations means then to understand the behavior of the man who follows that occupation. To analyze the occupation of blacksmithing is to analyze the blacksmith, not every blacksmith, but the expert blacksmith, not every movement that he might make, but the essential ones which he must make, not the random and useless ones, but the ones that lead directly to the desired result. When once this analysis of an occupation has been made an adequate statement of the facts will give a science of that occupation.

To rephrase the discussion, we may say that work in its whole range from the crudest forms in uncultivated workmen to its highest refinements in the masters of arts is a form of human behavior, occurring according to definite laws. The facts and laws here concerned are open to scientific observation and constitute a legitimate part of the domain of psychological study. When these facts are discovered and the laws formulated, we will have a *science of work* upon which we shall be able to found industrial, educational, and social practices that will mean immeasurable gains in the efficiency of human endeavor. Our first big task in establishing the science of work is the adequate analysis of the occupations which society has given itself.

TO LEARN BY DOING SOMETHING IS TO LEARN WITH THE FULL HELP OF INSTINCT.—Thorndike.

TWO UNITS OF MANUAL TRAINING FOR HIGH SCHOOLS

Edited by Ira S. Griffith

IT seems clear that cities with populations ranging from 25,000 to 100,000 are hardly warranted in working out the problem of manual training for general educational purposes as fully as it has been worked out in the larger cities. To suggest a line of work of the greatest significance, with an expenditure for equipment within the reach of such cities, is one of the problems now before the manual arts department of the University of Missouri. The outlines which follow have been developed in connection with the class in administration and organization of the manual arts, and tested with the second year boys of the University High School.

Manual Training finds a place in high schools because it provides the "industrial experience," a fundamental experience not obtainable thru other school subjects. To have the greatest educational value, the specific experience of the shop and drafting room should be generalized in the mind of the student. This means that to the "making of something," the art, there must be added an understanding of the fundamental principles, the science, underlying the processes outlined in the syllabi, and the student should be brought to see the significance of his specific shop experiences in their relation to other life experiences.

The formation of a habit of knowing the name of every tool and the names of their principal parts, the habit of carrying on necessary conversation in proper technical terms, the knowledge that underlying every process of every trade are reasons based upon hundreds of years of "race experience" that can be resolved into scientific statements which the student should know,—these things, as well as the manipulation of material, are essential factors in the industrial experience.

The work should consist of (1) recitation upon assigned reading closely related to the work under way in shop or drafting room; (2) lecture-demonstration of new work about to be executed; (3) shop or drafting work. The recitation should not exceed ten or fifteen minutes. The lecture-demonstration, if properly planned, need not exceed twenty minutes.

The use of a text is recommended as the most efficient way of placing before the students material for study. Such a text should deal with principles in general rather than in connection with some specific project, and the assignments should be made from day to day according to the subject-matter under consideration in the shop rather than by page sequence.

From one-third to one-half of the time allotted to a unit should be devoted to mechanical drawing.

For pedagogic reasons, woodwork and mechanical drawing should both, in the main, make use of the "useful model." To cover the principles outlined for the first unit in one year, the "useful" model must give way to a maximum emphasis upon the "exercise." Where suitable equipment, time, and teaching staff are available, the more elementary subject-matter in both mechanical drawing and woodwork should be given in the upper grammar grades. For this elementary school work, not less than 2½ hours per week for two years or 5 hours per week for one year should be given; the equipment should be not unlike that used in the high school; the teacher should be as well prepared for this special work as is the high school teacher. Under such conditions the high school may more nearly meet proper high school standards in this work.

The subject matter should be so planned that new matter may be introduced gradually. Instruction should be by class rather than individual. The use of the "group system" is strongly recommended[1] as the most efficient way of providing class instruction with due consideration of individual differences on the part of pupils.

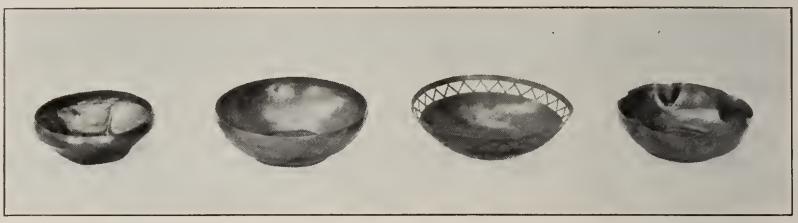
FIRST UNIT

The outline of work for the first unit is as follows:

Mechanical Drawing—The problems of the drafting room should be made to connect as closely as possible with those of the shop. The introduction of mechanical drawing subject-matter in an orderly manner should not be sacrificed to meet such correlation, however. By proper selection and arrangement, working drawings may be made the means of introducing many, if not all of the conventions enumerated below.

The following should be considered: (1) Freehand lettering: placing, form, slant, spacing, stroke. (2) Working drawings: woodwork,

[1] For an illustration of such grouping of subject-matter, consult *The Teaching of Manual Arts* by Crawshaw and Selvidge, Bulletin No. 546, High School Series, price 10c, University of Wisconsin, Madison, Wis.



ART METALWORK PROJECTS

ART METALWORK PROJECTS

EXAMPLES OF FOUNDRY WORK

stock bills, material costs figured, freehand working sketches. (3) Straight lines: use of T-square, triangles, pencil, ruling pen, dividers, scale, conventional lines. (4) Circles: use of compass, center lines, cross-hatching. (5) Tangents: location of centers and points of tangency. (6) Planes of projection: elementary principles of projection. (7) Revolution of objects: "views" of objects in simple and inclined positions.

Woodworking—The following should be considered: (1) Laying-out tools: rules, try-square, framing-square, bevel, marking gage, slitting gage, mortise gage, dividers, pencil, knife. (2) Saws: crosscut or hand-saw, rip-saw, compass-saw, back-saw, turning-saw, filing of saws. (3) Planes: kinds of planes, setting and adjusting irons, squaring up mill-planed stock, squaring up rough stock, face marks, planing a chamfer. (4) Boring tools: brace, auger bit, drill bit, gimlet bit, countersink bit, screwdriver bit, brad-awl, thru boring, boring to depth. (5) Chisels: kinds of chisels; horizontal, vertical and oblique paring, paring chamfers, the firmer gouge, grinding beveled-edge tools, whetting beveled-edge tools, oilstones, shapes of cutting edges of various plane irons, testing for sharpness. (6) Form work and modeling: making a cylinder, making curved edges, modeling. (7) Duplicate part work: laying out duplicate parts, scraping, sandpapering, hammers, nails, nailing, nailset, withdrawing nails, screwdriver, screws, fastening with screws, designation of nails and screws, glue, clamps, gluing and clamping. (8) Joinery: the dado, cross-lap, glue joint, doweling, keyed mortise-and-tenon, blind mortise-and-tenon, miter joint, dovetail joint. (9) Wood: structure, growth, respiration and transpiration, moisture, shrinkage, weight, grain. (10) Lumbering and milling: lumbering, milling, quarter-sawing, waste, transportation, seasoning, lumber terms and measurements. (11) Common woods: classification and properties of cedar, cypress, pine, spruce, ash, basswood, birch, butternut, cherry, chestnut, elm, gum, hickory, maple, red and white oak, sycamore, tulip or yellow poplar, walnut, mahogany. (12) Wood finishing: kinds of finishes, application of filler, stains, wax, copal vanish, shellac, patching, painting, rubbed finishes.

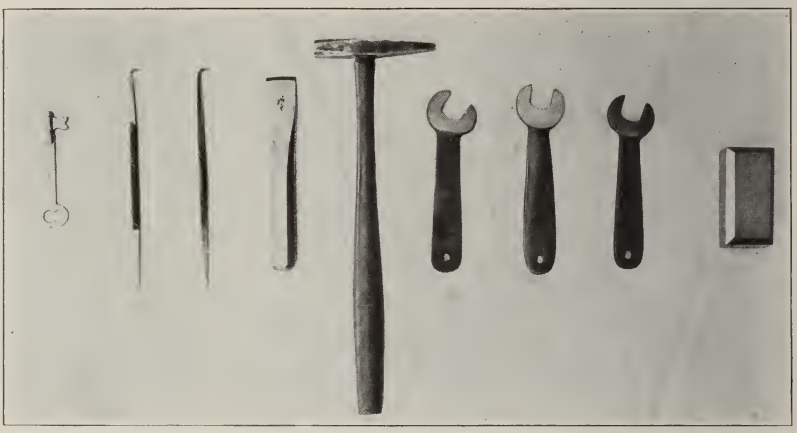
SECOND UNIT

The outline of work for the second unit is as follows:

Mechanical Drawing—(1) Mechanical lettering: placing, form, slant, spacing, stroke. (2) Working drawings: metalwork. (3) De-

velopments: prism, cylinder, pyramid, cone. (4) Intersections: axes in the same plane, axes in different planes. (5) Isometric and cabinet drawing.

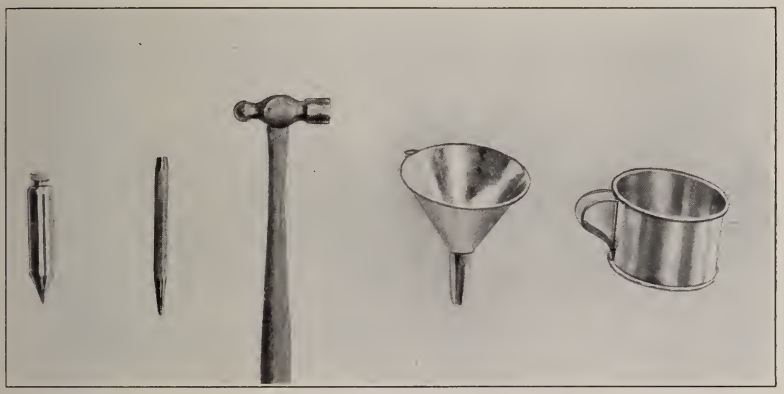
Metalwork—The work outlined may cover (1) Forging: drawing out, bending, twisting, welding, hardening, tempering. Other subject-matter considered: various kinds of forges, anvils, hammers, tongs, fluxes, iron, steel; various methods of hardening, reduction of iron ore, relation of forging to the industries. (2) Benchwork: chipping, grind-



METALWORK PROJECTS

ing, filing, testing, fitting, drilling, riveting, polishing. Additional subject-mater: kinds of chisels, uses, cutting angles, shapes, various abrasives, kinds of files, ways of testing, various drills, drilling machines, polishing mediums and methods, case-hardening. (3) Molding: tempering of sand, ramming, coping, venting, gate-cutting, coring, pouring. Additional subject-matter: molding sands, parting sand, use of trowel, slick, rammer, vent-wire, gate-cutter, sprue-pin, baked and green sand cores, kinds of patterns (wood and metal), several part patterns and molds, metals that may be cast. (4) Art Metal: work done in copper, brass, and sheet iron, beating, raising, etching, drilling, sawing, annealing, repoussé, planishing, finishing, soldering (hard and soft), bending, punching, riveting. Additional subject-matter: production of copper, brass and sheet iron, designing, transferring, use of copper-smithing tools,

planishing hammers, neck hammers, stakes, anvils, blowpipe, jewelry saws, repoussé tools, chiseling of sheet iron. Relation to copper-smithing, and sheet metal industries. (5) Hand lathe work: hand-tool turning, filing in lathe, drilling, polishing, thread cutting with tap and die, annealing, hardening and tempering. Additional matter considered: various kinds of lathes, various tools, machine and hand cut threads, various methods of hardening and tempering, methods of annealing, relation to commercial tool making. (6) Tinsmithing: cutting out patterns, rolling, seaming, grooving, bending, wiring, soldering. Additional mat-



METALWORK PROJECTS

ter considered: making of tin-plate, use of brake, edging machine, wiring machine, shears, rolls, crimper, relation to the manufacture of tin and sheet-metal articles.

MECHANICAL DRAWING

General Equipment

12 double drafting tables with drawers	$132.00
24 drafting boards	18.00
24 T-squares, ambro lined, fixed head	36.00
24 ambro 45x45, 8″ triangles	11.52
24 ambro 30x60, 8″ triangles	8.64
24 triangular boxwood scales, 12″	12.00
24 sets drawing instruments	96.00

1 case for drawing boards, etc.	30.00
1 teacher's desk and filing cabinet	30.00
1 set American drawing models	1.50
6 erasing shields	.75
6 assorted irregular curves, ambro	2.25
Standard books on mechanical drawing and allied subjects	15.00
1 blueprint frame (made by boy in woodwork class)	.50
Total estimate excluding discount	$394.16

Personal Equipment

This the school should buy and sell to the students so that it will be uniform, but the student should pay for it.

24 ink erasers	$ 2.40
24 pencil erasers	2.40
24 doz. ⅜″ thumb tacks	.75
24 pencils, 5-H	2.40
24 pencils, 2-H	2.40
24 bottles waterproof ink, black	6.00
Special pens and holders	3.08
Medium grade drawing paper	9.60
Imperial tracing cloth	9.60
Blue-print paper	7.20
24 pieces art gum	2.40
Total	$ 48.23

The drafting room should contain ample blackboard space and a sink, and plenty of light.

EQUIPMENT FOR WOODWORKING

Individual Tools

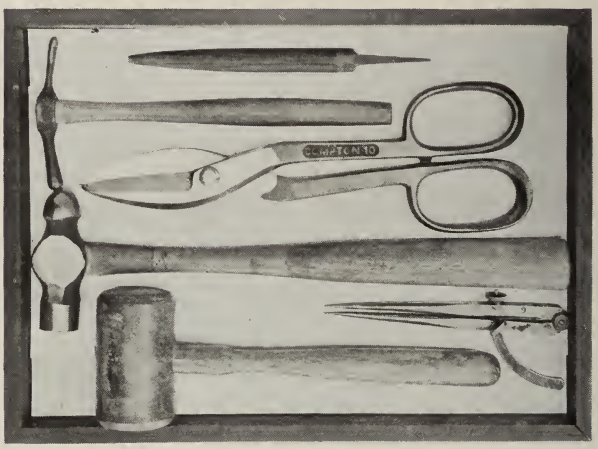
24 benches with rapid-acting vises, Toles'	$240.00
1 demonstration bench	25.00
25 Stanley planes, No. 605½	42.50
25 Disstons' back-saws, 12″, 14 pt.	23.25
25 Buck Brothers' or D. E. firmer-chisels, ⅜″	4.61
25 Buck Brothers' or D. E. firmer-chisels, ¾″	5.58
25 Sloyd knives, 2½″ blades	4.50
25 Adze-eye hammers, 13 oz.	10.25
25 round hickory mallets, 3″x5″, Stanley No. 1	3.00
25 Stanley try-squares, 6″	5.75
25 marking-gages	3.00
25 Stanley rules	4.25

25	maple bench-hooks	4.18
25	bench brushes	5.75
25	Van Deusen bench stops	3.75
	Total	$385.37

General Tools

4	Disston crosscut-saws	$ 5.50
4	Disston rip-saws	5.50
2	turning-saws in frames	1.75
1	Disston compass-saw	.30
1	coping-saw	.40
1	Stanley miter-box	7.50
6	spokeshaves	1.50
2	drawing-knives, D. E. or White's	1.60
1	dowel-plate	.15
6	assorted scrapers	.60
1	Stanley plow plane	7.50
2	flat files	.30
6	slim taper files, 6″	.54
2	India oilstones	1.95
1	soft Arkansas oilstone	.18
1	oil-can, 1 pt.	.10
4	Disston sliding T-bevels	1.00
3	Sargent steel squares	1.80
3	wing dividers	2.25
6	scratch-awls	.75
1	large try-square	.50
1	firmer-chisel, 1″	.45
1	firmer-chisel, 1½″	.45
1	firmer-chisel, 2″	.54
3	D. E. ratchet braces, 8″	4.50
3	sets small gimlets	1.00
2	sets R. J. auger-bits, $\frac{3}{16}$″ to 1″	7.00
1	Clark's expansive bit, ½″ to 1½″	.60
3	countersinks	.75
2	screwdriver bits	.30
2	brad-awls	.30
1	screwdriver, 12″	.55
1	screwdriver, 8″	.55
1	screwdriver, 6″	.20
6	nailsets, assorted sizes	.50
6	steel bar carpenter clamps, 3 ft.	9.50
2	steel bar carpenter clamps, 5 ft.	3.50
12	Jorgensen handscrews, 10″	4.75
12	Jorgensen handscrews, 8″	4.00
6	carriage makers' clamps	1.50

1 kerosene glue heater	1.50
1 monkey-wrench, Coe's	.60
6 varnish brushes	1.50
10 cheap paint brushes	1.00
Grindstone	30.00
Motor	60.00
Saw-set	.50
Saw-clamp	.65
1 set steel figures	1.90
1 set steel letters	1.90
Total	$178.07



SHEET METAL TOOLS

Lockers for unfinished work will cost about $4.00 per pupil and glue and varnish tables $4.50 per running foot, according to the Montclair, N. J., system, which is highly recommended for convenience and completeness.

About ten per cent should be added to the cost of equipment for breakage and supplies unthought of.

The total for tools and supplies for the first year would be, excluding power saw and other machinery, and instructor's room, etc., for 24 boys

General tools	$178.07
Individual tools	385.37
Lockers, exhibition case and tables for staining, etc.	168.00
Total	$731.44

Extras will cover the per cent off for buying in quantity.

EQUIPMENT FOR INTRODUCTORY METALWORK

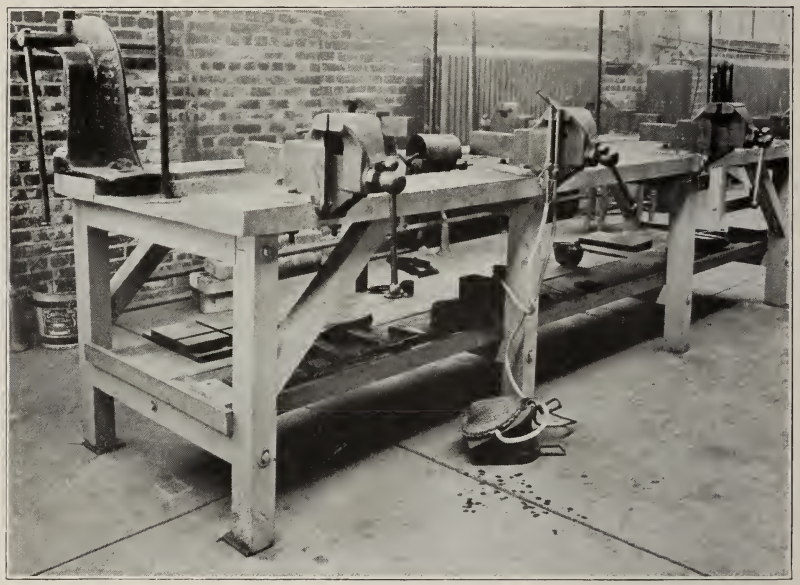
Sheet Metal

Benches for 12 pupils, 2″ lumber, 3′ per pupil	$ 50.00
12 Hanson anvil vises	72.00
12 cold chisels, ¾″	4.80
12 snips, No. 12	9.00
12 ball pein hammers, No. 159, 12 oz.	6.00
12 rawhide mallets, No. 4, 2″ face	8.40
12 hammers (copper), No. 302	9.00
12 half-round bastard files, 8″	2.25
10 wooden hand vices	3.00

MOLDING TOOLS

6 flat pliers, No. 1653A, 5″	1.02
6 round-nose pliers, No. 1652A, 5″	1.02
2 metal cutting shears, No. 5, 8″	6.00
1 blowpipe (gas), No. 2, ¼″ bore	2.00
1 foot bellows, No. 24, 10x12	5.60
1 soft soldering outfit, No. 1	.75
1 soldering copper heater	1.60
2 Miller's Falls hand-drill, No. 1	2.50
2 doz. drills, 4/64, 6/64, 8/64	1.00
5 jewelers' saw-frames, No. 60, 4″ deep	3.75
1 gross jewelers' saw blades	1.00
5 half-round, second-cut files, 6″	1.00
5 prick punches	.75
5 stickers for perforating shades	.50
2 wire brushes	.70
5 Eagle pencil dividers	1.25
1 doz. sheets emery cloth, No. 0	.40

5 riveting hammers, No. 121, 7 oz.	1.75
3 planishing hammers, 8 oz.	2.85
3 hammers, No. 304	3.75
1 stake, No. 8	1.25
1 stake, No. 10	2.50
4 anvil heads, No. 202	1.40
4 anvil heads, No. 203	1.40
2 anvil heads, No. 213	.70

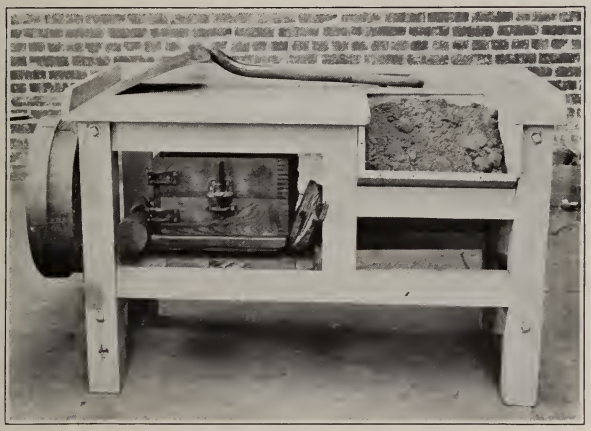


METALWORK BENCH

1 leveling block, about 40 lbs.	2.00
1 can transparent lacquer, 8 oz.	.50
2 camels hair lacquer brushes, ⅝″	.20
1 can asphaltum, ½ pt.	.25
1 set riveting tools	.75
1 doz. water color brushes, No. 2	.50
1 doz. water color brushes, No. 6	.50
4 burnishers, No. 91, 5″	2.40
1 repoussé pitch block, with pitch	1.00
6 repoussé tools	2.10
Blocks of hard wood	
Blocks of steel or iron ½″ to ¾″ thick for riveting	
Total	$221.09

Foundry and Forging

6 trowels, No. 1, 1⅛″ wide 5½″ long	$ 2.16
6 bench lifters, No. 41, ⅝″ wide	2.40
6 draw-spikes	.30
6 sand riddles, 18″, brass wire, 8 or 10 mesh to 1″	6.00
6 bench rammers, No. 199	3.60
4 split handle moulders' shovels	4.60



MOLDING BENCH

6 rapping irons, ½″ square stock, 8″	.50
4 bellows, 10″	4.00
6 soft bench brushes, No. 8	1.50
4 straight-lip tongs, 20″	1.20
4 gad tongs, 20″	1.80
4 bolt tongs, ½″ stock, 20″	1.80
2 round hand punches, ⅝″ and ¾″	.40
1 heading tool, ⅝″	.80
1 hot cutter, 1¾″	.75
1 cold cutter, 1¾″	.85
1 top swage, 1¾″	.75
1 bottom swage, 1¾″	.80
6 camels' hair brushes, ¾″	.60
3 barrels brass molding sand	6.75
1 hand ladle with shank (1 gal.)	1.00
2 Buffalo geared blower forges, No. 651	40.00
Ladles, skimmers, etc.	5.00
Total	$87.56[2]

[2] Prices and numbers for sheet metal and foundry and forging equipments have been taken from the "Red Book" published by the Orr & Lockett Hardware Co. of Chicago as being representative prices that can be obtained from any standard company.

Flasks may be made in wood shop at small expense or purchased at varying prices.

Gate cutters may be made from scrap metal.

Straight edges, 2 ft. long, may be made from scrap strips from wood shop.

Parting sand, a clean lake or river sand, may be easily procured or bought by keg.

If money for equipment is available it is recommended that two additional groups be added: hand turning with power lathes that cost from $40.00 to $75.00 each, and tinsmithing. Light machines for tinsmithing may be bought from The Peck, Stow and Wilcox Co. of Cleveland, Ohio, as follows:—

1 Columbian turning machine, No. 542	$ 10.25
1 stovepipe former, 30″, No. 2	18.00
1 folding machine, 30″, No. 2A	7.00
1 bench shears, cut 8, ¾″, No. 2	7.00
	$ 42.25

MADE AT THE SLOYD TRAINING SCHOOL, BOSTON

DOMESTIC ART IN TIME OF WAR

IDABELLE MCGLAUFLIN

THE last half year has opened up a great variety of new problems for the human family to solve. With ten nations involved in a great conflict, trade conditions disrupted, industry paralyzed and the actual necessities of life lacking for several millions of people, the consequent misery is unthinkable.

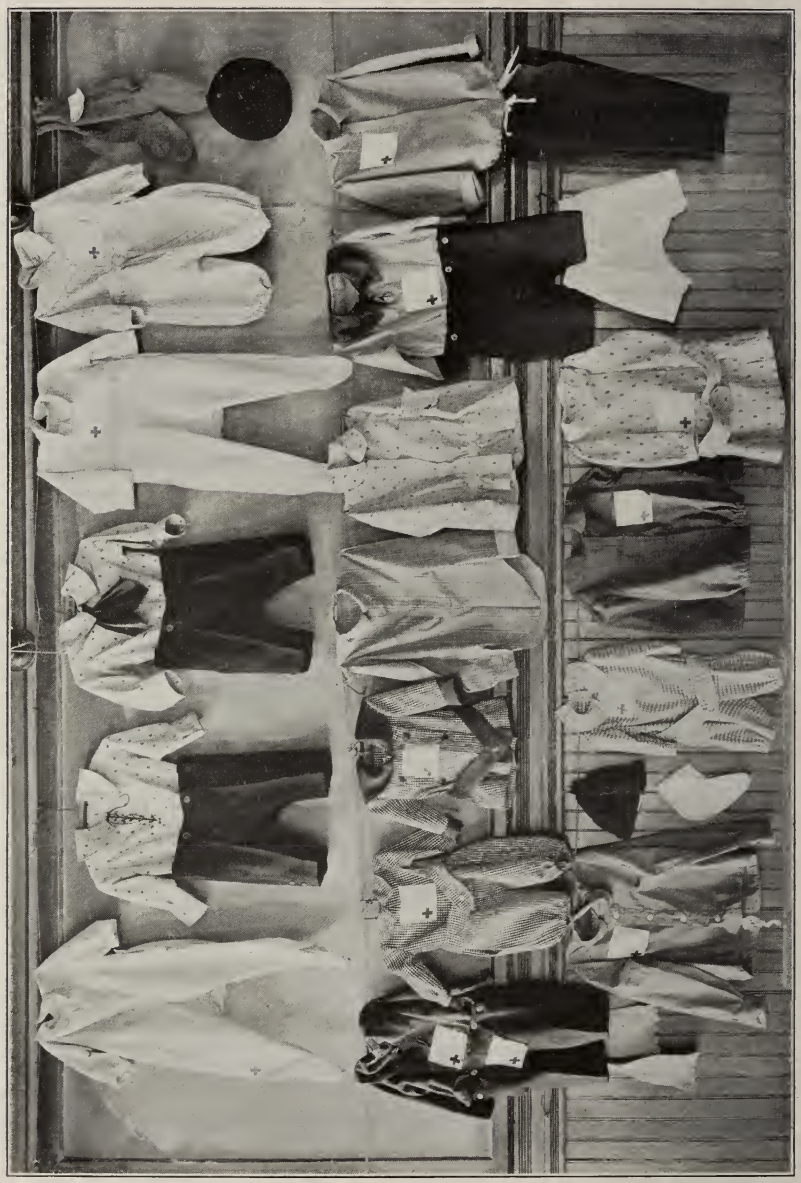
Thru the smoke of battle and the dark pall of human hate that hangs today over all Europe, shines one little ray of light—the light of love and pity for the innocent victims. To America they look for aid, and are not pleading in vain. We hear daily of the bountiful generosity of the rich, and the noble sacrifice of many less fortunate, but I wish to tell you of a splendid thing done by the little childern of Denver.

In early October the older girls begin their garment work in the sewing classes of the public schools. This year they were given a choice between making clothing for themselves or a warm garment for some poor, little, homeless child among the refugees of Europe. This mere suggestion started an epidemic of good will—yes, and what is more to the point, an epidemic of good deeds. The book lessons suffered or were eclipsed, we admit, by the greater lesson of service to humanity. I wish I had words to picture to you the enthusiasm, the love, the sympathy, and the self-sacrifice that went into the making of these garments.

> Not what we give, but what we share,
> For the gift without the giver is bare;
> Who gives himself with his alms feeds three,
> Himself, his hungering neighbor and Me.

The sewing department offered to furnish materials to the poorer districts, or wherever requested, but not many yards were asked for. The children brought flannel, outing flannel or anything that would make up into a warm garment, and settled down to steady, hard labor for weeks. The boys brought money, sometimes in pennies, earned by selling papers, to purchase cloth for the girls to make up. One little Italian boy who had donated his mite said to his teacher with all the anxiety of a father of a large family, "Haven't them there kids any clothes at all till we can get these over there?"

In one school they organized and followed the factory plan of piece work. The older girls planned, cut, stitched and finished. The younger



A SECTION SHOWING BOYS' CLOTHING

ones basted and made collars, cuffs, and belts, and together turned out sixty-six children's beautiful dresses. Each class decided what they would make, and nothing was omitted, from an infant's layette to the

THE BABIES' CORNER

boys' trousers made from father's last year's suit or the teacher's dress skirt, ripped, washed and pressed. There were shirts and skirts, bloomers and blouses, kimonas, coats, caps, knitted mittens and mufflers, night-gowns, hoods and aprons, rompers, waists and pajamas. Every garment

was labeled with the size on a Red Cross Tag. Sometimes little notes were slipped into the pockets, "I hope your papa isn't killed," and "I have been happy every minute when I worked on this," and "This is the first garment I ever sewed, I loved every stitch." Maybe the children to whom these garments are given will not understand the language

TWENTY-SEVEN HUNDRED GARMENTS MADE BY THE SCHOOL CHILDREN OF DENVER FOR THE EUROPEAN REFUGEES

but that doesn't matter, for they are sure to receive the benediction of love that went into every piece.

Of far greater value than the material benefits to the recipients has been the moral uplift and the stamp of benevolence upon the character of the donors. Only those teachers who were in accord with the spirit of the movement were asked to participate, and only the children whose parents wished it were privileged to have a part in this labor of love. The response from the parents, teachers and pupils was magnificent, and far surpassed all expectation. Twenty-seven hundred warm, comfortable garments were made and placed on exhibition for the public to inspect, before starting on the long journey across the ocean under the auspices of the National Red Cross Society.

The work was generally of high quality, surprisingly so for that of young girls of the fifth, sixth and seventh grades. There was never the thought that the work could be slighted because it was for the poor, but on the contrary, there was an almost feverish anxiety lest it should not be good enough to be sent. The remark of one child will illustrate the usual attitude: "I never thought I should send even a post card to Europe, and now, just think, I've made a dress to go."

The ever much-to-be-desired interest of the home in the work of the school came about naturally. In one of the poorer districts the mothers of the Parent-Teacher Circle became so interested that they asked for yarn—which was gladly furnished—and, altho they were hard-working women, they knit seventeen pairs of men's wool socks which were sent with the children's donation. In the rush of the last days, desiring to get the clothing to the needy as early as possible, mothers volunteered to help in the finishing which took the little inexperienced fingers so long to do.

From the domestic art point of view the experiment was a success. It has given an impetus to the work and aroused the lagging interest of the indifferent teacher to greater vitality. Nor are the good effects merely transitory. Next year, we plan, in place of our usual mending exercise, to repair warm garments for our own unfortunate poor. The bread cast upon the waters has already returned many fold in the vision revealed of the more far-reaching possibilities for our sewing classes.

MAN'S TECHNICAL PROBLEM IS THE MAKING OF MONEY AND WOMAN'S, THE ART OF SPENDING IT JUDICIOUSLY. BUT MAN'S BUSINESS PROGRAM OF THE MAXIMUM OF PRODUCTION WITH THE MINIMUM OF EXPENDITURE SHOULD PREVAIL ALSO IN THE HOME, WHICH, INSTEAD OF BEING COMMERCIALLY PRODUCTIVE, IS HUMANLY SO.—Anna C. Hedges.

LOCKERS FOR UNFINISHED WORK.

ALBERT F. SIEPERT

HISTORY does not record how the first teacher of shopwork cared for the unfinished work of his pupils during the period of time between meetings of the class. Possibly that difficulty did not arise until more recent times, but his followers have devised

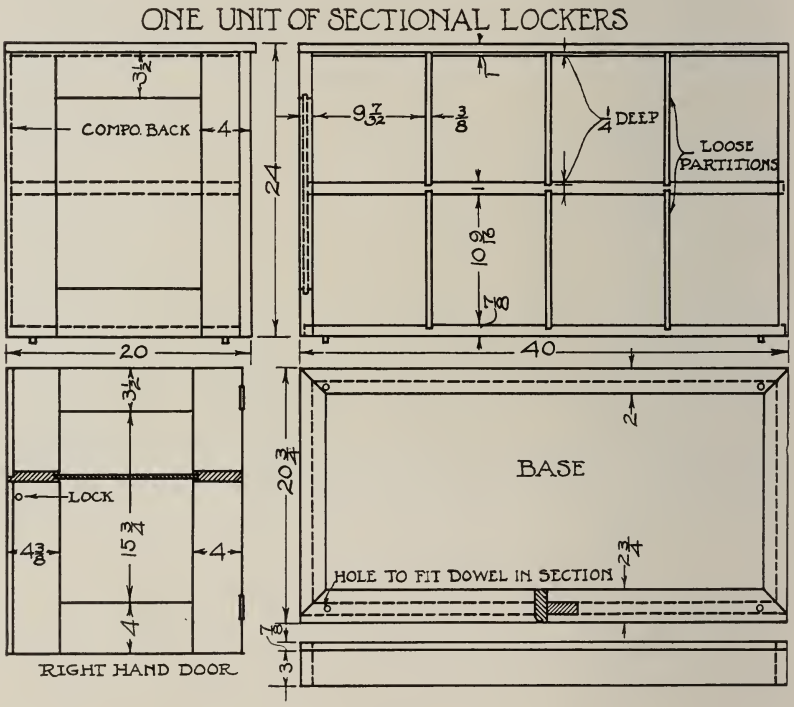


FIG. 1

many schemes ranging from the makeshift open shelf to something more practical and convenient. The attempt in every instance has been to provide adequate storage space. The requirements vary according to the nature of the work to be stored, yet some demands are basic, such as convenience, size, cost, space available, etc.

The shops used for the work of the grammar grades are too often a variable quantity; usually overcrowded, rarely permanent in their ar-

rangement as successive teachers come and go. These facts make a locker system desirable which can be moved or arranged in new ways. A case providing fixed spaces for a given number of pupils affords no opportunity for storing the larger pieces which some of the better workers may at times undertake. The drawer under the bench has some merits, not the least of which is that it utilizes what otherwise would be waste space, yet it is open to the objection that dirt easily accumulates in it,

FIG. 2

that it offers only a small space for a limited number of students, that the work is not in the most convenient form to get at, and that the drawer material increases the cost of the bench. These considerations, among others, led to the idea of the sectional locker which would provide a variable space for the work of a student and which was composed of sections or units fitting interchangeably. Such a locker system was described in a short article in the "Current Items" of the April, 1911, issue of this Magazine. This locker was built at Montclair, N. J., under the direction of C. L. Boone, formerly director of Art and Handwork. Many requests having come for a drawing is the reason for this article at the present time.

The drawing and photograph, Figs. 1 and 2, illustrate two sections of a locker built in the shops of Bradley Institute following the same idea.

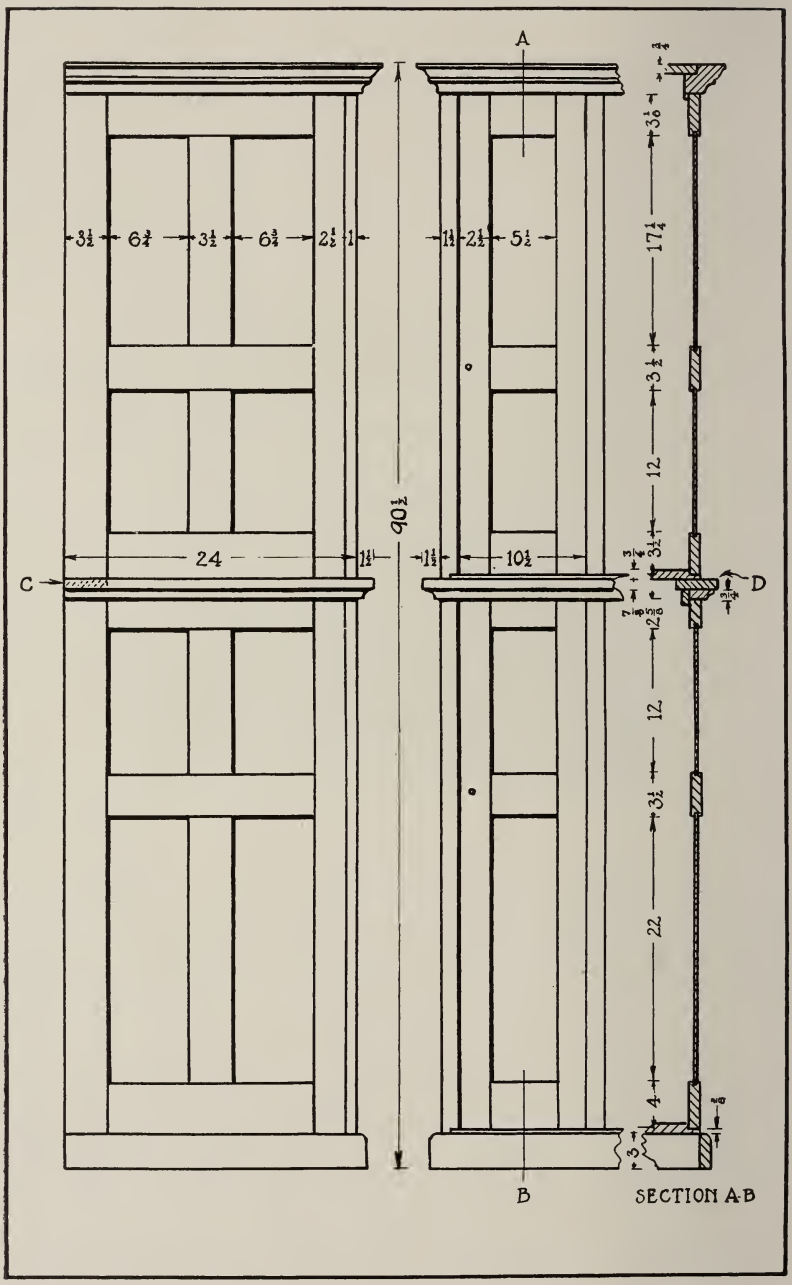


FIG. 3

Several changes have been made to improve certain minor points. The top has been made flush with the ends instead of having a $\frac{1}{8}$″ overhang, thus doing away with the space between sections and the chance to "lose" a bad piece of work. The length has been increased by 4″ to give each student 1″ more of space. Each section is intended to provide quarters for the work of eight pupils under ordinary conditions. When the space indicated on the drawing, Fig. 1, does not suffice, a partition may be pulled out, Fig. 2, giving double the space; since all vertical partitions

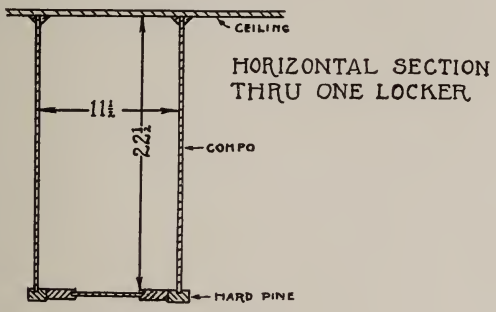


FIG. 4

are loose the locker may be arranged to fit the needs of two, four or eight pupils. The sections may be piled three high giving the upper lockers to the tallest boys. They are held in position by dowels fitting into holes bored into both top and bottom of each unit, the holes being located by a template or jig. The lower section is set on a base to raise it up from the floor so the doors swing freely. Each section is fitted with a lock and key which remains in the teacher's care. The doors and ends are panel construction. The top, middle and bottom are glued up solid. The back is of Compo board, while the partitions are glued-up stock, cut so the grain runs vertically when the boards are slipped into the grooves in the horizontal members. The Montclair lockers, made of cypress, cost (in 1910) $12 per section; the one indicated in the illustrations is of hard pine and made to order in the shops of the Institute at a somewhat lower cost.

The problem of caring for unfinished work of high or normal school students in such classes as furniture construction, is a difficult one for every instructor wishing to have his classes move along smoothly without loss of material or having the shop present a disorderly appearance. The size and quantity of material used by such students makes the

horizontal type of locker rather inconvenient both as to size and getting at the particular piece wanted. Students of this age may be asked to be responsible for the safekeeping of their work by giving each one an individual locker for which he carries the key.

A locker for this type, Fig. 3, of work was designed and built during the present year for use in the advanced woodworking shop at Bradley Institute. These lockers were built in six sections and accommodate

FIG. 5

the work of fifty-eight normal students. The upper sections will take pieces of stock under 40″ in length, while the lower are 5″ higher. Each locker is $11\frac{1}{2}$″ wide by $22\frac{1}{2}$″ deep, thus giving ample room for all ordinary pieces until they are assembled, and the chances for loss are rather small. The partitions are set permanently in place by having one edge held in a groove cut in the hanging stiles of the doors, Fig. 4, and the other between two triangular strips nailed to the back of the case. These partitions are made of Compo board instead of being paneled. The back is made of ceiling. The lower section has no top except the bottom of the upper section, however a member, C, Fig. 3, ties the ends of each section together. Several crosspieces running from this member C to the front D are necessary to give the case sufficient rigidity. The hanging stiles are made of 1″ material while the doors are but $\frac{7}{8}$″, and hung flush with the inside. Each door is fitted with a lock and key differing from all the others, the locks being of the same series as those used in various other places about the school and so master keyed.

In designing this locker a number of items became guiding principles. (1) General dimensions were determined by the sizes of stock for the usual furniture making projects, while the more exact dimensions were set by the available wall space and number of students to be provided for. (2) The top of the upper lockers was placed on a level with the heads of the doors in the shop and the molding is the same in character thus insuring an attractive "sky-line." One good feature is that the

FIG. 6

top of the locker is too high to afford a convenient place for odds and ends which so often detract from an otherwise well-kept room. (3) The lock of the upper sections was placed low enough to be within reach of a key fastened to the ordinary key chain; the lower locks being at a height to be unlocked without stooping.

The photograph, Fig. 5, illustrates the material for the lockers as it appeared in the process of construction, the various truck-loads being the particular parts of the job assigned to individual members of the class in machine woodworking. Fig. 6 shows the sections assembled and set in place. Hard pine was used thruout and stained to match the trim of the room. The cost is approximately $2 per individual locker. The real value is just beginning to be appreciated not only in the greater convenience of handling unfinished work but in the marked improvement in the appearance of the shop.

EDITORIAL

SOME very intesesting phases of the vocational education problem were brought forward in a conference of superintendents of schools in small cities, conducted by the Bureau of Education in connection with the Cincinnati meeting of the Department of Superintendence of the National Education Association. Doubtless this was expected by those who planned the conference, for it ought to be evident that the conditions in cities of less than 25,000 inhabitants are more typical of the country as a whole than conditions in the great cities. In the first place, as was pointed out by Commissioner Claxton, there is less division of labor in the small cities; more trades are pursued as a whole. In the small city one workman often carries a process thru from raw material to finished product. There is a great variety of trades in the small city, but few workmen in each trade. These facts indicate that it is comparatively unnecessary as well as difficult to carry specialization very far in the schools of the small city. In the second place it was noted that in the small city conditions are more favorable to effective action than in the large city because the superintendent of schools has greater freedom in working out his problems. Outside of finances he has a better opportunity than the superintendent of a large city; he has more power. However, doubt was expressed whether the superintendents in small cities generally appreciate the greatness of their opportunities.

Vocational Training In Small Cities

The discussion at the conference centered about a few propositions which may be stated as follows:

1. The demand for vocational education, even in the small cities, is so insistent that it must be heeded. If the schools are not going to provide vocational training some other way will be found to get it. Present social conditions demand it.

2. Taxes "have reached the breaking point." Many communities cannot stand any higher tax. The increase in available funds for school purposes must necessarily be very small unless new sources are made available.

3. To provide vocational training at public expense outside of the present public school system means decreasing the funds for the public schools and consequent paralysis of the present progressive movement in such schools.

4. Any adequate system of vocational education must include much that is now well developed in the public schools. To provide for this in a separate system means more or less duplication, and such duplication is not economical.

5. The public schools need just the elements that give character to vocational training. These are needed not only to enable the schools to serve the community in a more practical and effective way, but also to stimulate improvement in the subject-matter of the curriculum and in methods of teaching. To fulfill their great social purpose the public schools must keep in close touch with community needs and interests, and one of the most vital of these is represented by the movement for vocational training.

6. Vocational training can be successfully given in the public schools. It not only can be, but it has been. Superintendents from several cities gave the results of their experiences. These show that effective vocational training in several lines of industry have been given in small cities and that the giving of such courses has very greatly increased the school attendance, and in some cases, put new life and vigor into the work of the schools. Moreover, as soon as it has become clear that real vocational training was being given there has always been a hearty response of approval from the local community.

7. Instead of attempting to teach all the details of every trade and industry of a given community to a comparatively small number of students, processes common to several occupations should be selected and taught together. As Commisioner Claxton expressed it, "There are some things so fundamental that they are transferable."

8. Manual training, which is already in the schools, should be the basis for the development of vocational training in small cities. This point was emphasized by the superintendents from Muskegon, Mich., Dunkirk, N. Y., Kenosha, Wis., and Boise, Idaho. The opinion seemed to be general that manual training should be modified and expanded as rapidly as possible to meet the new needs. One spoke of introducing "larger projects," another hoped that some one would make a study of machine operative processes. Superintendent Meek told of thirty boys who were engaged all summer in completing the wiring of the Boise high school building, under the direction of the manual training teacher. He told of cement walks and posts and dairy barn floors that were made by boys, of a $240,000 building that was planned, and specifications written by pupils working under a teacher of drawing in

Boise who is also an architect, and of orchards sprayed and cows tested by the school boys working under the direction of a teacher of agriculture who is an expert dairyman and educated farmer.

9. Part-time schools are practical in small cities as well as large, and in communities where there are varied industries as well as where there are a few highly specialized industries. This is true if flexible courses are provided and reasonable adjustments are made in the school. "It ought to be possible," said Commissioner Claxton, "to put all children thru the high school while working at the trades."

On the whole this conference was significant because it revealed an insight into one of the big problems of vocational education and a rather definite policy on the part of the Bureau of Education. It also suggested how much easier it may become to solve problems when men working under like conditions get together in conference. It demonstrated that the small cities as well as the large are actually doing something to solve the problems of vocational education. And finally it indicated that new and larger responsibilities are rapidly coming upon the teachers of manual training. This will mean more extended preparation for teachers of manual training, and probably a somewhat different kind of preparation for service in the smaller cities.

—C. A. Bennett.

Education and Industrial Unrest

Recent years have witnessed, in this country, a number of bitterly contested struggles between groups of employers and employes. Few of these struggles have been terminated by agreements satisfactory to both sides, many of them have been accompanied by deplorable loss of life and destruction of property, as well as crystallization of feelings of bitterness and hatred, and all have been attended by extreme inconvenience and enormous losses to the non-combatant third party—the public. No one who will take the pains to inform himself with reference to current social problems can fail to be impressed with the increasing gravity of certain situations, nor will he be able to repress a feeling of apprehension as to whether we really are, socially speaking, resolving our difficulties.

One of the important symptoms of the seriousness of these difficulties was the organization last year of the United States Commission on Industrial Relations, which has been "probing the causes of unrest." Already the editors of various publications have begun to find fault with the Commission for its deliberation, and for its failure to produce prompt results along lines suggested by the critics. Whether the criticisms which

have been launched against the policies and methods of the Commission are well-founded or not, it is certain that one thing has been accomplished during the past few weeks that will ultimately be of tremendous significance. A number of men of great wealth and influence in the commercial and industrial world—men who are recognized and respected as leaders among leaders—have recently been interrogated as to their opinions and their sense of responsibility with reference to specific cases of industrial discontent and disorder. These men have permitted themselves to be put on record, according to reports in the press, as professing complete ignorance in regard to the details and causes of the difficulties under review, and admitting that they possessed no "formulated opinions" with reference to questions so vital and fundamental that, as one writer put it, "every high school boy ought to be informed" thereon.

A Prescribed Course of Study

Whatever may be the merits of the explanations offered by these gentlemen for their ignorance of important matters, there can be no possible excuse for their failure to take immediate steps to remedy this condition. Respect for leadership in a democracy can not long coexist with popular suspicion of incompetency or ignorance on the part of the leaders. No one can doubt that the men referred to are leaders, not only by native capacity, but by training and experience. They must be the first to recognize the obligation laid upon them by this public inquiry, and exposure, so to speak, of their pervious neglect of plain duty. They have probably already entered upon a strenuous course of study, thus prescribed by popular demand. Not one of these gentlemen could afford to face another inquiry a year hence and plead ignorance concerning the matters now so forcibly brought to their attention.

The practical significance, for the cause of education, of this episode lies in the fact that a group of the most influential men in the country are now addressing themselves to the serious study of questions which can never be permanently and satisfactorily settled without, at the same time, solving the problem of education for industrial workers. These men have resources at their command that are practically inexhaustible; they are accustomed to the idea of carrying through any undertaking upon which they embark. The arousing of the personal interest of these men means an augmentation of the forces at work on the problems of vocational education quite beyond the possibility of immediate appraisal.

—William T. Bawden.

OF CURRENT INTEREST

EDUCATIONAL EXHIBITS AT THE EXPOSITION

THE Palace of Education at the Panama-Pacific Exposition houses an exhibit strikingly different from such exhibits heretofore. The distinctive characteristics are that each exhibiting state, or city, or school shows its one great specialty, the achievement for which it is unique, thus avoiding duplication, and that unusual vitality has been put into the whole display by showing with specimens of pupils' work the methods of reaching these results.

Massachusetts, for instance, has spent $23,000 to show the marked success of her many vocational and textile schools. This exhibit covers about 2,000 square feet of space. Four large electric models hold the center position. One is a map of Massachusetts, 5x2½ feet, on which small lights of different colors show how completely the state is honeycombed with state-aided trade schools. Illuminated lines show the localities from which students are drawn for each school. Another model repersents a typical locality in which a factory and a nearby industrial school cooperate in a system of part-time education. Here figures represent young men at work in the factory and another group studying in the school; then at the press of an electric button the two groups of figures exchange places. The other models are of this same type, one illustrating extention work in evening trade schools and the other in agricultural schools. Near these models four machines show in continuous pictures, groups of boys and girls and men and women doing different types of vocational work. When the pictures do not adequately tell the story brief paragraphs are added. There are about 1,000 of these pictures, all taken especially for this exhibit.

New York has devoted $35,000 to demonstrating the benefits of her state educational supervision, whereby all licenses, diplomas and methods are regulated from Albany, thus keeping up a high standard in medical, commercial, and vocational institutions as well as in the public schools. A huge relief map, 20x30 feet, with electric equipment shows the effect of this central control over every school in the state. Ohio has specialized on her unequalled work in agricultural and horticultural high schools. Wisconsin's display, largely paid for by contributions of public school children, is devoted to university extension work. Ohio shows how her

rural schools are effective neighborhood centers, while Indiana and Utah show what they have accomplished thru consolidating their rural schools. Oregon also specializes on rural schools, but emphasizes the use of the credit system whereby pupils receive merit for labor done at home. Illinois' exhibit is largely of models of play grounds and standardized superior school buildings of different types.

Certain cities and schools are also contributors because of some distinguishing achievement. Among these is Gary, Indiana, with an exhibit of one of her all-day and all-purpose public schools as they exist only in that one city in America. St. Louis devotes most of its space to an educational museum, Pittsburgh to schools of mining, Los Angeles to school social service, Boston to school medical inspection, and Oakland, Calif., to education of the defective. Other California cities will illustrate new methods of outdoor study and outdoor schools.

The University of Cincinnati specializes in cooperative courses in engineering and continuation schools, the Carnegie Institute in higher technical education, Princeton in the higher education of women and the University of California in bacteriological and laboratory work.

The United States governemnt is represented by an educational exhibit prepared by the National Bureau of Education covering "national problems," work in the District of Columbia, Alaska and among the negroes and Indians. State agricultural experiment stations, agricultural and forestry colleges and farm activities in public schools also have valuable exhibits. Connected with these last is the convention of the "Top Notch Farmers' Club." Membership in this unusual club may be secured only by the boy or girl who has raised a hundred bushels or more of corn on an acre of ground. There will be about nine thousand of these junior corn kings assembled, and their proceedings will interest seniors no less than juniors.

Splendid foreign exhibits are expected. Germany and France have promised to transfer in their entirety their great educational displays which will be shown at the Lyons Urban Exposition, France, until this coming May. Thirty-eight other foreign nations have contributed to the Palace of Education.

Moving pictures play a new and important part in all these exhibits, not only as another means of graphic representation for exhibits, but also as a valuable factor in education.

From the above partial review it must be evident that the exhibit in the Palace of Education is big, not only in the sense of covering much

MEMBERS OF THE ILLINOIS MANUAL ARTS ASSOCIATION IN ATTENDANCE AT THE MEETING IN DANVILLE, FEBRUARY 12 AND 13, 1915. AT THIS MEETING THE FOLLOWING OFFICERS WERE ELECTED: A. G. BAUERSFELD, CHICAGO, PRESIDENT; C. E. HOWELL, DECATUR, VICE-PRESIDENT; L. A. TUGGLE, DANVILLE, SECRETARY-TREASURER. THE MEETING NEXT YEAR WILL BE HELD IN JOLIET

space and including work from all parts of the world, but is big because it includes all the important phases of education, each phase represented by its best exponent.

ILLINOIS MANUAL ARTS ASSOCIATION

The twelfth annual meeting of the Illinois Manual Arts Association held in Danville, February 12 and 13, was one of the most enjoyable held by this Association. It was marked by the manifest interest of those in attendance and the very cordial hospitality of Danville.

At the first session, the greetings from the Danville schools were extended by the supervisor of manual training, L. A. Tuggle.

The essentials of evening school work were well presented by Prof. F. H. Evans of Bradley Institute. Mr. Evans pointed out the successes and failures as shown by ten years' experience. His talk was marked by a keen insight into evening school problems and brought out clearly and forcibly solutions to a number of perplexing questions, such as attendance, courses of study, organization, and methods of presentation.

Mr. James of the Illinois State Normal University, in a very humorous manner, made a strong appeal for the use of freehand drawing by the manual arts teacher. A feature of this session, if not of the entire meeting, was the report by C. E. Howell, on the Springfield survey. The value of the survey to education in general and to Springfield was so clearly shown that a committee was appointed to make a state-wide survey of the manual arts in the public schools of Illinois. In the final business session, a committee consisting of C. E. Howell, chairman, Decatur, L. D. Perry, Joliet, and L. A. Tuggle, Danville, was authorized to proceed at once on a survey of the state to include all cities and towns, except Chicago, offering manual arts in the public schools. This committee will report at the next meeting of the Association. This commitee desires that members of the Association and all others interested will communicate with the chairman, offering suggestions as to information desired.

The Lincoln Birthday banquet of the Association was spread for 100 guests in the luxurious Elks' Club and was the most enjoyable feature of the meeting. The address by J. W. Walker, president of the Illinois Federation of Labor, was a strong appeal to teachers to cooperate with the labor movement and to oppose the Cooley bill now before the legislature. Mr. Milliken of the John Worthy School of Chicago, gave an

interesting description of the work of the boys who come under his charge and the value of manual and vocational training in that school.

At the Saturday morning session, Principal Bogan of the Lane Technical High School of Chicago, gave an address on "the passing of the man teacher." Mr. Bogan offered a strong argument for the man in the schools, and appealed to the man teacher to put forth the necessary energy thru vocational education to maintain his position. Dr. L. D. Harvey of Stout Institute, in an able address, defended manual training in the newer movement for vocational education. He opposed the Eastern claim that manual training is a failure. Dr. Harvey says manual training is no more a failure than arithmetic, history, or any other subject now in the curriculum of the schools. A sharp distinction between manual training and vocational education, Dr. Harvey said, could not be made, and in strong terms he defended the position of manual training as a valuable and necessary feature of school work, quite as important as vocational education. Prof. E. J. Lake of the University of Illinois offered many concrete examples of constructive design which were much appreciated.

At the Saturday morning session, Mr. Geilen of the Chicago Normal College, presented a model lesson in benchwork to a class of eighth grade students from the Danville schools. This new departure brought forth much interesting discussion. It is hoped that this plan of having a manual training "clinic" may be followed in future meetings and produce many good results.

THE ILLINOIS QUESTIONNAIRE AND BILL

In January a "Questionnaire on Costs of Vocational Education" was sent to the school superintendents in such states as already have state-aided vocational education. This questionnaire was one of the means used in gathering data for the investigation conducted by the Legislative Committee on Vocational Education, "a body appointed by the Illinois State Teachers' Association for the specific purpose of making a thoro and extensive study of vocational education in the United States, with the view of recommending a sound policy relating to legislation on the subject."

The required data includes detailed information concerning, first, relative costs of vocational education under different types of school administration; second, relative costs of vocational education under different types

of school organization; and third, relative costs of vocational and non-vocational education. This data is to be studied by statistical experts and the results published and distributed among all cooperating in the investigation.

The Legislative Committee has since drawn up "A Bill for Vocational Education on the Unit System" to present to the state legislature. The bill proposes that the State aid the schools, under certain conditions, by paying half of the expense of maintaining vocational education. It provides for the establishment of a State Board of Vocational Education constituted as follows:

> The state superintendent of public instruction, who shall be the executive officer and chairman of said Board, and six persons, either men or women, who shall be appointed by the Governor, by and with the advice and consent of the Senate, two of whom shall serve for two years, two for four years, and two for six years from July 1, 1915, and until their successors are appointed and qualified; and successors in each class shall be appointed for a term of six years. Two of the appointive members of said Board shall be employers of labor; two shall be employes, or recognized representatives of organized labor, and two shall be persons engaged in educational work.
>
> The State Board of Vocational Education shall have the following powers and duties: (1) To define the minimum qualifications of teachers of vocational subjects. (2) To determine what subjects, courses, and classes come within the provisions of this act. (3) To provide for inspection thru duly authorized agents, of school districts seeking state aid. (4) To establish all further necessary rules and regulations for carrying out the provisions of this act. (5) To approve of the payment of state aid, as hereinafter provided, to such districts as shall comply with the provisions of this act.
>
> Said Board shall report to the General Assembly a comprehensive plan for the training of skilled workmen as teachers of vocational subjects. . . . Said Board shall also investigate the facts regarding the supply of and demand for the various types of skill and efficiency . . . and such other matters as may affect the policy of the State regarding vocational education, and shall report to the General Assembly the results of such investigations, together with its recommendations for extending or restricting the provisions of this act.

As regards what schools shall be affected, the bill stipulates that "Any school district of Illinois having a population of more than 1,000 may elect to come under the provisions of this act by a majority vote of the Board of Education, or other governing body of said district, or, upon petition of five per cent of the qualified voters" if certain proposals are accepted. Provision is also made for smaller school districts which maintain a four-year high school course, including vocational work, and for rural districts, either singly or combined, that establish or maintain courses in agriculture or household arts, or both.

When a school district has elected to come under the provisions of this act (in accordance with the conditions of the act) there shall be established in said district a Council on Vocational Education, which shall be constituted as follows: The superintendent or principal . . . shall be ex-officio a member of said council, and four persons, men or women, shall be elected by the Board of Education . . . Two of the elective members shall be employers of labor and two shall be employes . . .

The members of said Council . . . shall have the right to sit with Board of Education . . . to take part in all discussions pertaining to vocational education. Said Council shall have the power and it shall be its duty to propose to said Board of Education . . . plans for the organization and teaching of vocational subjects and courses, and said Board of Education . . . shall confer with, and seek the advice of said Council on all matters relating to vocational education under the provisions of this act and on all matters relating to the qualifications of teachers employed to teach such subjects and courses.

A MODEL SCHOOL IN THE COPPER COUNTRY

A modern school with city equipment located in a primeval forest, 16 miles from the nearest village, and surrounded by a sparsely settled country where the people do not speak the English language, is certainly unusual. But such is the Otter Lake Agricultural School built in a community of Finish farmers who have settled in the copper region of northern Michigan. For twenty-five years these people have lived by themselves practically cut off from the rest of the world. The school was built two years ago, not only to educate the children but to help make agriculture one of the successful industries of the district.

The school stands at the corner of a wooded school ground of forty acres. It is an eight-room two-story structure, not counting small rooms and basement. It is equipped with electric lights, gas, water under pressure, plumbing, and hot-water heating, precisely as in a city school. It is also equipped with apparatus for teaching manual training, domestic science, and agriculture by laboratory methods. The dairy department is furnished with a cream separator, a Babcock tester, and a large rotary churn. When a chicken house was needed it was built by the boys in the manual training classes. In it is a flock of pure-blodded fowls. Other pure-blodded live stock is soon to be added to the school farm, as the school seeks to be an agency whereby better grades of live stock are introduced into the community. Four acres of the land belonging to the school have been cleared, and most of this has been planted with cereals and vegetables of a variety superior to that found in the neighborhood. So far as is practicable the out-door work is done by the

girls as much as by the boys. Each pupil has one hour a day of either domestic science or agriculture and the boys have manual training in addition. One hundred and fifteen children have been in attendance this year. Under the Michigan law they must continue in school until the age of sixteen.

Thru the skillful direction of J. A. Doelle, the superintendent, the school is more than a school, it is a community center that has worked great changes among the grown-ups as well as among the children. Altho new, the school has already proved itself well worth the $18,000 that it cost. This school is one of a township system that includes eleven smaller schools and another well equipped high school.

A WAR TIME EXPEDIENT

Teaching a new trade to skilled workers who have been thrown out of their own job because of the war is now going on at Toynbee Hall, the original social settlement in London. Altho a war expedient in this instance, it has its bearings on times of peace when men find their skill unmarketable thru the invention of some machine that takes their place.

At the outset of the war, it was seen that the furniture trade would be seriously injured by the decline of exports and by the fact that in times of retrenchment people buy little furniture. On the other hand, the leather trades, as is always the case in time of war, have been increasing, for not only has the newly created British army to be suppiled, but England is furnishing millions of pounds' worth of goods to the French and Russian governments. Manufacturers have found it impossible to get workers enough. To supply this need and at the same time to help unemployed cabinet-makers, the government provided for the maintenance of a trade school. Within five weeks, 64 out of the initial enrollment of 139 had found employment in the new line of work. Only two left because they could not learn the new trade. All, so far, who have stayed for a month's training have found a job. It is interesting that one-half of the men placed have been between forty and fifty years of age and that the directors of the school find the men over forty, and inded over fifty, quite as quick and adaptable as the younger men. The results of these experiments may have permanent value. The transfer of skill to the point where it is most needed is one of the serious present industrial problems.

A NEW AUTOMOBILE COURSE

The experience of Bradley Institute during the past two years in giving instruction in automobile repair work in its short winter course for farmers, and during the present school year in teaching the principles of automobile construction and operation to evening classes and to selected day school students has led to the announcement of a one year course in automobile construction, operation, maintenance and repair to begin next September. The course will be under the immediate charge of Professor Frederick H. Evans.

SHORT COURSE STUDENT GRINDING THE VALVES ON AN AUTOMOBILE.

The course is designed for garage men, chauffeurs, and car owners who wish to acquaint themselves with the principles of operation and the mechanism of gasoline automobiles and acquire sufficient skill with tools to enable them to make ordinary repairs and adjustments with confidence, and to operate cars intelligently. The course will include:

(a) Shop practice in disassembling and assembling automobiles, hand tool repair work, such as clipping, filing, fitting, drilling, riveting, also lathe work, tire repairing, etc.

(b) Lectures on automobile construction and design and study of text-book.

(c) Drawing, both freehand and mechanical, but especially sketching various automobile parts. The purpose of this is largely to acquaint the pupil with the construction of different makes of machine.

(d) Electricity as applied to the automobile—batteries, magnetos, ignition systems, self starters, etc.

(e) Practice in "trouble shooting," making the finer adjustments and driving.

THINGS FOR BOYS AND GIRLS TO DO AT HOME

Suggestions on interesting and useful occupations can be obtained from the organizers of the Farm and Home Handicraft Clubs. These clubs are being formed under the auspices of the United States Department of Agriculture. Here are a few of the things that are on the list of what girls and boys can do at home: rope tying and splicing; making seed testers, a hen coop, brooder, fly trap, bird house, hotbed, cold frame, step-ladder, market crate for vegetables, a farm gate, a fireless cooker, a home canner, a fruit juice and cider mill; repairing a whiffletree, a pair of shears, a fork handle, a gate, a chair, a table, a picture frame, a door lock or hinge, and a torn book; laying a cement walk or floor, drawing a plan of an eighty-acre farmstead; making the plans and specifications for a model farm house; fabric dyeing and printing; and weaving baskets for use in gathering and marketing vegetables and fruit.

It is planned that each club member select about ten of the suggested tasks and do each of them during convenient moments. The results of the work of all the members of one club will be exhibited at the end of a year's time in a place where the rest of the community may see what has been attempted and pass judgment on its value.

Any teacher desiring detailed information, may write to the Office in Charge of Club Work for the Northern and Western States, United States Department of Agriculture, Washington, D. C.

SHOP NOTES AND PROBLEMS

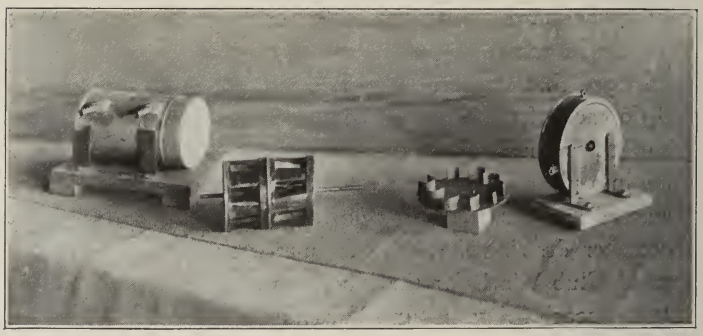
ALBERT F. SIEPERT, Editor

SOME PROBLEMS IN STEAM. II

The four steam turbines illustrated and described in this issue are original developments of those given in the March number. Each one is the invention of the boy who made the first one of its kind. They are larger in size and require a greater volume of steam than the three with boilers attached, so that the source of steam must be a separate boiler. The fourth article of this series will be concerned with simple boilers adequate for this purpose.

TURBINES WITHOUT BOILERS

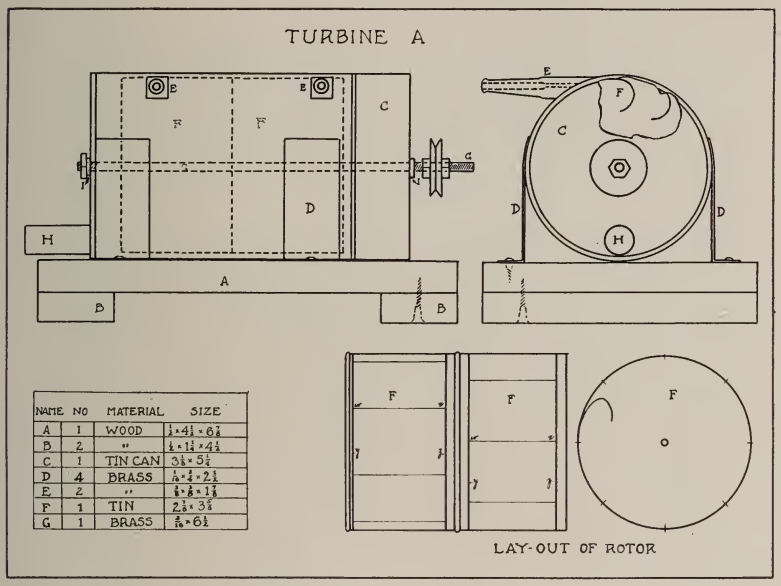
As the four machines of this group are similar in many respects, one of



A D

them will be described in detail and attention called to those features in which the others differ from it. The turbine A is made to use two jets of steam. The nozzles E are made of square brass rod filed down one end to fit into a piece of rubber tubing and drilled thru as shown on the drawing, using a larger drill first and then a smaller one, the size of the latter depending upon the available volume of steam. In this case a drill $\frac{1}{16}$" diameter is satisfactory. A more simple and easily constructed nozzle would be a piece of $\frac{1}{4}$" brass tubing having one end closed by fitting into the opening a piece of brass and drilling a hole of the required diameter thru the plug. The case C is a large baking powder can which is fastened to the base A by means of four brass strips D bent L-shape and soldered fast. Four round head screws thru holes in the short leg of the strip hold the assembled case down on its foundation. The shaft G is made of $\frac{3}{16}$" brass rod, threaded at one end for a nut and at the other for a wooden V-groove pulley tightened up between two nuts. This

arrangement makes provision for taking up end motion. The shaft bearings are holes bored in the exact centers of the ends of the case. These bearings are reinforced by copper washers I drilled to fit the shaft and soldered fast. The rotor F shown at the right of the case in the photograph is made of two cans slightly smaller than the case, these are laid out as shown and cut on the lines w-y, w-x, and x-z, after which the free end is bent on the line y-z in the manner indicated and described in the first group. These cans with their lids are then assembled on the shaft and soldered fast. Each part of the rotor has eight vanes and the two cans are so arranged before soldering that one vane

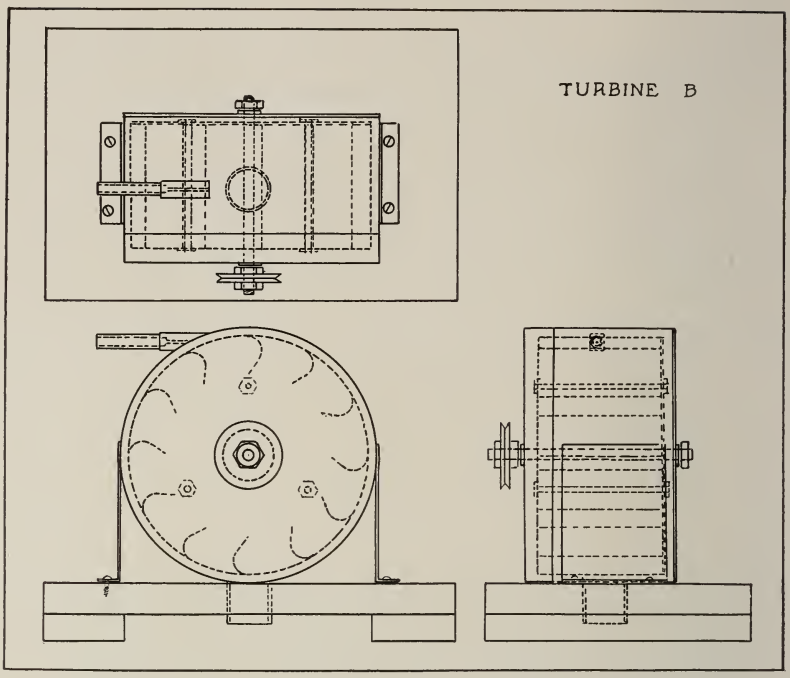


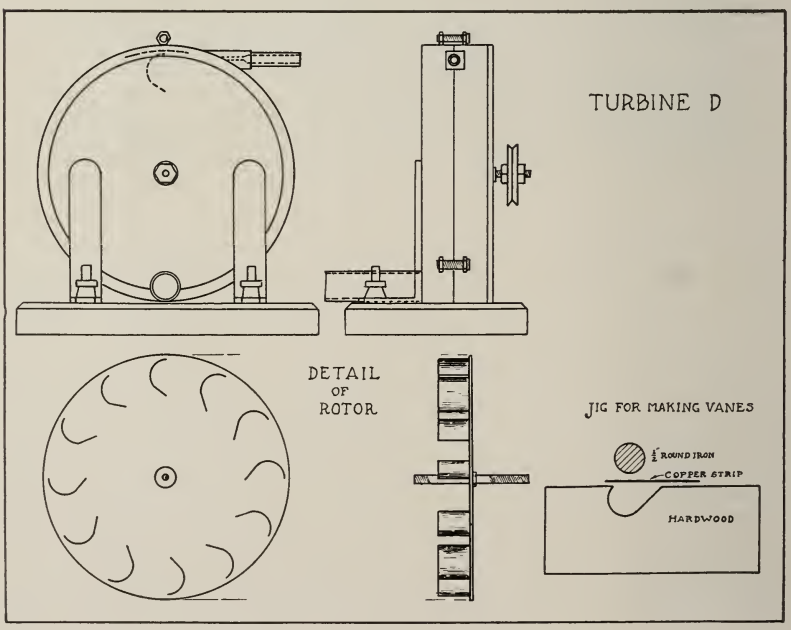
NAME	NO	MATERIAL	SIZE
A	1	WOOD	$\frac{1}{2}\times 4\frac{1}{2}\times 6\frac{3}{8}$
B	2	"	$\frac{1}{2}\times 1\frac{1}{2}\times 4\frac{1}{2}$
C	1	TIN CAN	$3\frac{1}{8}\times 5\frac{1}{2}$
D	4	BRASS	$\frac{1}{16}\times\frac{1}{2}\times 2\frac{1}{2}$
E	2	"	$\frac{1}{8}\times\frac{1}{8}\times 1\frac{1}{8}$
F	1	TIN	$2\frac{1}{8}\times 3\frac{5}{8}$
G	1	BRASS	$\frac{5}{16}\times 6\frac{1}{2}$

on one can falls half way between two vanes on the other. The exhaust H is made of tubing soldered over a hole in what was the bottom of the baking powder can. This serves to carry the spent steam and water away from the base. This turbine made 5,000 revolutions per minute when hooked up to the 40 lb. pressure steam main of the school.

Turbine B has a marshmallow can for its case. The construction is evident from the drawing. The photograph shows this machine with a third bearing in an outrigging built up of sheet metal, but the boy who made the drawing could not be convinced by the builder of the need for this third bearing and so omitted it. The rotor is made of a slightly smaller can laid out and cut as those of the first group. The lid of the can is held against the rotor proper by three $\frac{1}{8}$" bolts and serves to stiffen the twelve vanes.

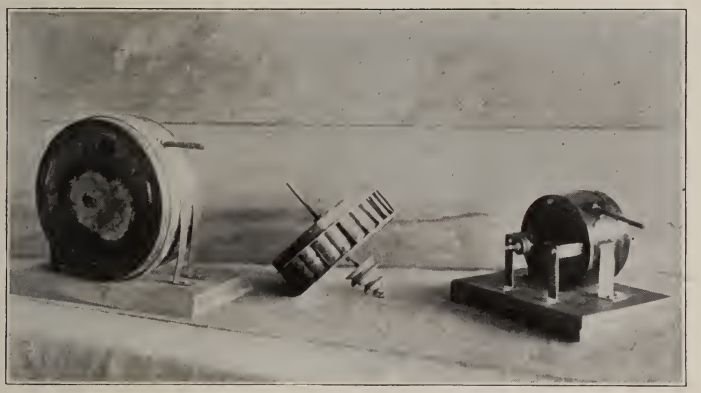
Turbine C is made exactly like B with the exception that the machine is much larger and has twenty-four vanes. It was made of two sizes of the


TURBINE B


TURBINE D
DETAIL
OF
ROTOR
JIG FOR MAKING VANES
ROUND IRON
COPPER STRIP
HARDWOOD

flat cans such as automobile grease is sold in, the case being about 8″ in diameter. Both of these turbines exhaust thru a large piece of tubing at the bottom of the case. The objection to C is that it requires a much larger volume of steam than the small boilers develop.

Possibly the best turbine of the group, when viewed from the standpoint of turbine design, is D. In all the other models the vanes were made by bending into shape the pieces of tin partly cut loose from the cylindrical portion of the can intended for the rotor. This presents certain difficulties as a limited amount of material is available and the bending must be done with round-nose pliers. The rotor of D is a disc of rather thick copper or brass to which twelve vanes are soldered fast. The problem of laying out twelve vanes on this disc so

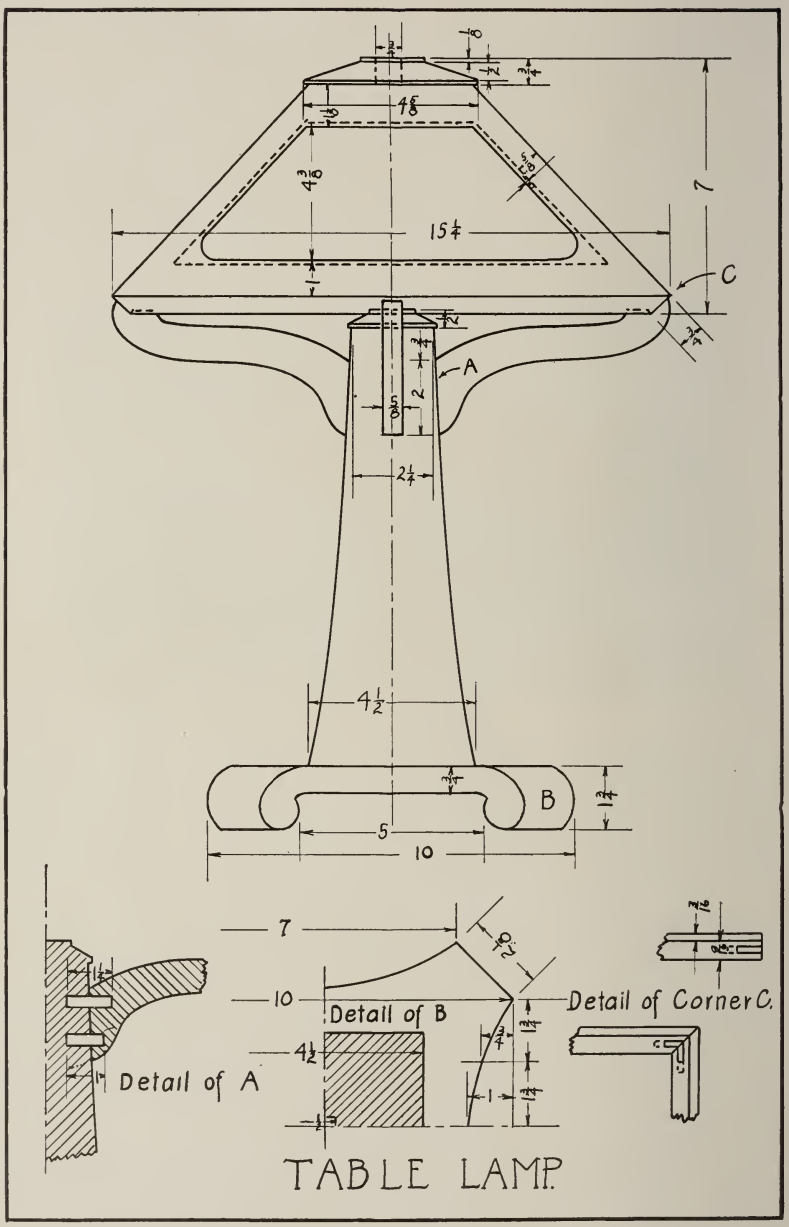


C B

that the jet of steam is bent in its course thru the maximum angle possible and so that the back action of the spent steam on the vanes following is reduced to the minimum is a good one, as it requires the boy to be familiar with turbine design. The strips of copper for the vanes are first cut to the required size, and then bent to correct shape with a jig or die. This jig is made of a piece of ½″ hard wood, in the edge of which the shape of the vane is cut. A piece of ½″ round iron is used as the plunger part of the jig to obtain the finished shape of the vane. The method of use is indicated in the drawing. The case of this machine is made of a marshmallow can cut down to 1″ in length. The lid is clamped to the case by means of machine screws which slip thru nuts soldered to it and thread into nuts soldered to the case. The usual L-shaped pieces of ⅛″x½″ brass are soldered to the lid of the case, while binding posts from old dry batteries, fitting thru holes in the short arms of the L, clamp the mechanism to the base.

These turbines have all run successfully at high speed and each has been tried out for power in propelling small secondary machines such as fans and generators. For any use requiring more power and less speed a gearing down mechanism is necessary and can be made from old clock works.

—Fred P. Reagle, Montclair, N. J.


15¼
7
C
A
2¼
4½
B
5
10
Detail of A
Detail of B
Detail of Corner C.
TABLE LAMP

ELECTRIC TABLE LAMP

The drawing and photograph present a project made at the Cleveland, O., East Technical High School by Norman Schneider, now a student at Bradley Institute. The illustration shows a lamp of mahogany decorated with both inlaying and marquetry work. The usual tool processes are involved in the making of the shade and base. The post is made of built-up stock and veneered

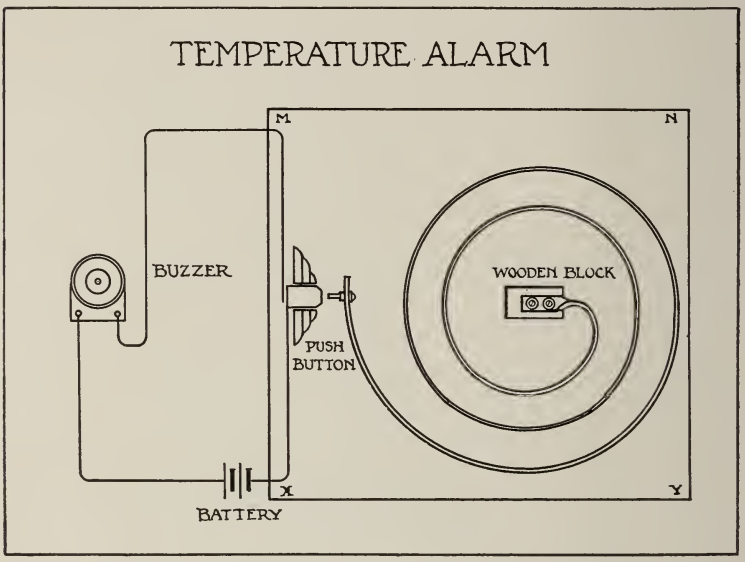
with mahogany. Art glass is used for the shade. Because of the free curves involved, the inlay of white holly and orange wood or artifically colored woods for the marquetry, this project offers many possibilities of correlation between design and construction, as well as the teaching of new processes.

TO PREVENT TOOL RUST

Tools used in basement shops or stored in damp places may be kept free from rust by the use of one of the following recipes contributed by Arthur F. Payne of Bradley Institute. Mix six parts lard and one part rosin and melt slowly together until the rosin is all melted. Add benzine to thin down until it has about the proportion of one pint of benzine to one-half pound lard. Rub over the tools lightly. A better way is to apply with a cloth, a very thin coat of mercurial ointment which can be purchased at any drug store.

TEMPERATURE ALARM

The materials required for this project include an electric push button, an electric bell or buzzer, a battery or dry cell, a wood block 2″x2″x4″, a board ½″x12″x12″, a piece of wrought iron $\frac{1}{16}$″x½″x3′ and a bolt.

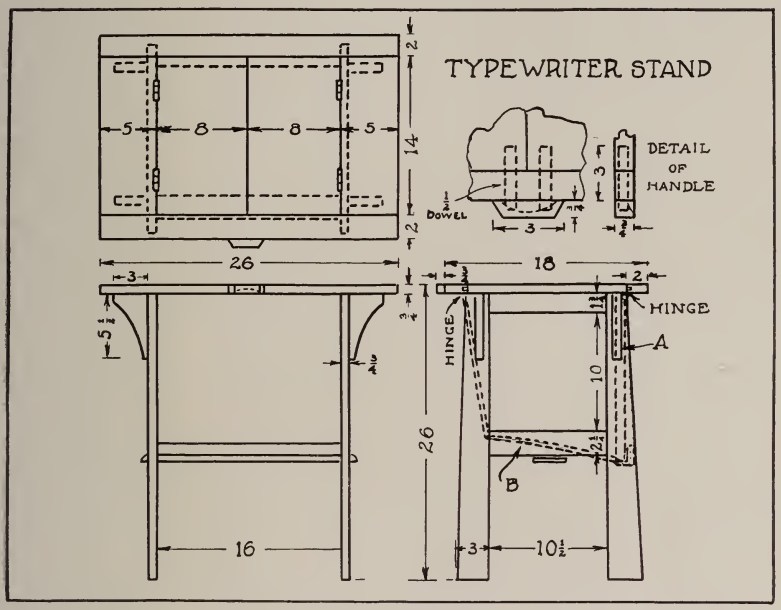


The wrought iron is forged into the shape indicated and fastened to a block at its inner end. This arrangement is then fastened to the board MNXY. A bolt is put thru the other end of the coiled spring as an extension to the push-button which is fastened at right angles to the board. The push-button is properly connected with the battery and buzzer and the whole apparatus adjusted so it works easily. The bell can be made to ring at the degree of temperature desired by adjustment of the bolt and push button. If low temperature warnings are desired the button must be placed at the right, or two push buttons may be arranged to give high or low warnings.

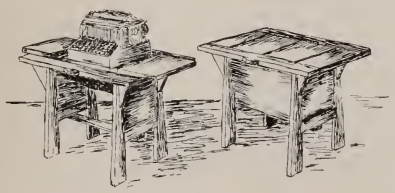
This instrument finds many uses such as an over-heated or underheated room, an incubator, etc. Once properly adjusted, it works automaticlly and with a high degree of accuracy. —Alfred Weiss, Chicago, Ill.

TYPEWRITER STAND

The drawing and perspective sketches of a typewriter stand sent in by H. J. Dean of Cleveland, Ohio, illustrate a piece of furniture intended for home



use. The working drawing shows the stand closed, the typewriter being fastened to the base A. The bottom B is made of pantasote which provides a flexible dust-proof material. The problem is intended for use in high school classes.



REVIEWS

Vocational and Moral Guidance. By Jesse Buttrick Davis, secretary of the National Vocational Guidance Association. Published by Ginn and Company, New York, 1914. 8¾x5 in.; 297 pages; price $1.25.

In this book Mr. Davis not only gives an account of what has already been done in vocational guidance as a whole, but tells of a most interesting experiment which has been carried on under his direction at the high school of Grand Rapids, Michigan, of which he is principal. Since the book was written to encourage others to establish vocational guidance centers, the author presents only such information as would be most helpful in such an undertaking. This encouragement is unquestionably given by the saneness and force of the discussion of methods and the theories back of these methods. As the title of the book implies, vocational guidance, as Mr. Davis understands it, has an ethical as well as a vocational side. Perhaps one of the greatest sources of inspiration, in a book full of inspiration, is found in just this particular phase of it.

The Book of School Handwork, Volume VI. Edited by H. Holman. Caxton Publishing Co., London. 9½x6½ in.; 240 pages; price per volume, 8s. and 6d. in London.

This volume completes this "encyclopaedia of educational handwork subjects, methods, materials, tools, and organization," as it has been called. In some respects the last volume is the strongest of the six, thus making a fitting close to the series. The longest chapter in this volume is on "Tools for School Handwork" written by James T. Baily. His discussion and illustration of fundamental principles is in many respects new and admirable. Stanley Deighton contributes an article on English cane basketry; handwork and gardening is discussed by W. H. Brooks and suggestions for woodworking models are given. W. Pearson Smith treats "Joints and Joinings in Handwork" and Percy A. Wells "Woodwork Decoration and Finishing." Mrs. Verona J. W. Spittle furnishes a chapter on "Handwork and Artistic Needlework" illustrated with some good designs in color. Several other types of work and several phases of correlation with academic subjects are treated in this volume.

Pottery Making. By Judson T. Webb, teacher of clay modeling and pottery making, Lewis Institute, Chicago. Published by Lewis Institute, 1914. 7¾x5½ in.; 72 pages.

Perhaps no one in this country has done so much to reduce the process of pottery making to such simple form that it can be taught in the public schools as has the author of this book. He has spent years in trying to simplify the processes of glazing and firing, and has invented a kiln, also a potter's wheel that operates like a sewing machine. In this book he has given to teachers the results of these many years of experience. It includes building, by hand, decorating, mould mak-

ing, and wheel work, casting, glazing and firing, and then ends with a course of study suitable for the elementary schools.

The book is not fundamentally a technical treatise but a safe and helpful guide to teachers.

Unit Photography. By F. M. Steadman. Published by D. Van Nostrand Company, New York, 1914. 8½x4½ in.; 160 pages; illustrated; price $2.00.

The author presents a system by which photography can be done with more certainty of outcome than heretofore, particularly in home portraiture, because he has developed a method of controlling light. Diagrams graphically illustrate the theory upon which this method is based and photographs show the results that have been accomplished by this system.

Pottery. By George J. Cox, instructor in pottery and modelling at Teachers College, Columbia University. Published by Macmillian Company, 1914. 7¾-x5 in.; 200 pages; illustrated; price $1.25.

According to the subtitle the book was written primarily "for artists, craftsmen, and teachers." Due consideration has been given to both the scientific and the art side of pottery. Enough of the scientific is given to make the book practical. This is done thru simple and exact statement of facts and processes, made still more definite by good illustrations. The spirit of art and craftsmanship prevades the whole book. This spirit is conveyed not only by what the author says with words, but by what he says by means of his pen drawings, that are much like the woodcuts of Albrecht Drürer. It is thru these drawings that the rich historic background of the world-old craft of pottery is suggested.

Handicraft Club Woodwork. By O. H. Johnson and R. K. Farrar, Junior Circular No. 32 for Iowa Boys' and Girls' Clubs, published by the Departments of Agricultural and Engineering Extension, Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.

A pamphlet of 32 pages giving working drawings, lists of material, stock bill, tools, and working directions for the making of a number of woodworking projects. The projects are a saw horse, home emergency case, barn medicine case, boy's trunk-chest, girl's skirt box, and a chicken brooder. An appendix contains notes on tools.

RECEIVED

The Social Aspects of Printing. By Leonard W. Wahlstrom and Elsa Miller. Reprint from the Francis W. Parker School Year Book, Vol. 1, 1912. Francis W. Parker School, Chicago, Ill..

Addresses and Proceedings, National Education Association, St. Paul, 1914. Durand W. Springer, secretary, Ann Arbor, Mich.

Mechanics of the Sewing Machine. This is one of the Joint Committee Monograph Series. National Education Association Edition. The chairman of the committee is J. A. Randall, Pratt Institute, Brooklyn, N. Y. The mongraph is published by the Singer Sewing Machine Co., New York City.

Report of Board of Education, Louisville, Ky. Dr. E. O., Holland, superintendent of schools.

Some Trade Schools in Europe. By Frank L. Glynn, director of trade instruction in the public schools of New Haven, Conn. Bulletin No. 23, 1914, issued by the U. S. Bureau of Education, Washington, D. C. Gives special attention to schools in Great Britain.

Housekeeping. A textbook for girls in the public intermediate schools of the Philippine Islands. By Alice M. Fuller. Issued by the Bureau of Education. Frank L. Crone, director. Manila, P. I.

Report of Board of Public Education, Pittsburg, Pa., 1913. William M. Davidson, superintendent. Gives considerable space to industrial training.

Helps for Domestic Science Work in Seventh and Eighth Grades. Bulletin No. 13, issued by the State Department of Public Instruction, Indianapolis, Ind.

Conciliation, Arbitration and Sanitation in the Dress and Waist Industry of New York City. By Charles H. Winslow. Bulletin No. 145 of the Bureau of Labor Statistics, U. S. Department of Labor, Washington, D. C.

Training Classes for Teachers in Vocational Schools. A circular of information issued by the State Board of Education, Boston, Mass.

Educational and Other Employee Relation, including outline of educational courses for 1914-15. Issued by The New York Edison Company.

Art: Outline Study in the Elementary Schools, Denver, Colorado. Prepared by Charles M. Carter. This comprehensive outline is accompanied by a book of illustrations by the children.

Drawing and Shopwork in the Schools of New York City. Sixteenth Annual Report of the City Superintendent of Schools. Reports of Dr. James P. Haney, Frank H. Collins and Walter S. Goodnough, with many illustrations.

The Curtis School of Printing for Apprentices. The Curtis Publishing Co., Philadelphia, Pa. This is a beautifully printed and illustrated booklet giving the form of apprenticeship agreement, etc.

Experimental Electrical Testing. Monograph for science teachers in educational institutions, published by the Weston Electrical Instrument Co., Newark, N. J. A compilation, including practical electrical measurements actually performed by students.

Synopsis of Recommendations for Vocational Education for Richmond. Made by the general survey committee. Published by the National Society for the Promotion of Industrial Education, 140 West 42d St., New York City. A pamphlet of 30 pages.

MANUAL TRAINING
AND
VOCATIONAL EDUCATION

MAY, 1915

VOCATIONAL INSTRUCTION IN THE HIGH SCHOOL

Herbert G. Lull

WITHIN the last decade the question whether vocational instruction shall be given in vocational departments of the high school or in an entirely separate school has arisen. The raising of this question is based upon the suspicion that vocational instruction cannot thrive in close relationship to the academic instruction of the high school. This suspicion is founded on two general premises, first, that the standards and methods of the academic branches will be imposed upon the instruction in the vocational branches, and, second, that there would be a social "taboo" exercised by the students pursuing the academic branches over those pursuing the vocational branches.

If we consider the first reason for separate vocational schools in the light of the history of secondary instruction in the United States the argument at first seems unanswerable, for what happened in determining the methods and standards of each new branch including manual training would happen to vocational instruction. The preparation of teachers, the character of textbooks, college entrance requirements, the dominating attitude of principals, superintendents, and even boards of education, have constituted the determining influences in imposing the traditional academic standard upon the new branches. The standardization of instruction in all lines is as important today as ever before, but we shall miss the meaning of the "scientific movement" which began to affect secondary instruction after 1880, if we continue to impose the standards of any branch or group of branches upon another. As the scientific movement tended to place instruction in the English language upon its own philological foundations and the instruction in the sciences upon their individual foundations, so the character of vocational instruction should be determined by considering its peculiar requirements. The tendency to bring in some forms of mechanical instruction and call them vocational instruction is all too prevalent. From the discussions one

hears in vocational meetings of teachers, it is perfectly clear that a large number of those participating do not yet see the distinction between instruction in manual training, commercial subjects, agriculture, and home economics as ordinarily conducted in the average high school, and the vocational instruction which might be given in the same departments. Then again, for economic and administrative purposes, vocational instruction in the high schools tends to become academic. Vocational instruction which does not cost more per pupil than academic instruction cannot be real vocational work, but must deal with emasculated so called "type forms." Vocational instruction fails if it does not follow closely the needs of the industries and the vocations.

The second reason advanced for separate vocational schools, no doubt, has more force in the eastern states where the stratification of society is more pronounced, but it has little if any force in the middle and western states. The success of the large cosmopolitan high schools of the western states where students of all classes of society attend and pursue a large variety of different studies is proof of this statement. Even in the East, however, the separate school would seem to carry the stratification still farther. If a vigorous attempt were made by the boards of education, the superintendents and the teachers to make vocational branches the most attractive work in the high school, it would be interesting to see how quickly the aristocracy of academic instruction would break down. The difference in this respect does not seem to rest so much upon the existence or absence of social stratification, after all, as it does upon the fact that social cleavage is or is not tolerated by the school administration. In this connection an interesting instance of how social cleavage may either be encouraged or discouraged by the administration is afforded by comparing the experiences of two neighboring cities of the West in introducing prevocational instruction in the seventh and eighth grades. One city established a few prevocational centers in certain sections of the city where the laboring classes lived. Much to the surprise of the administration the work proved unpopular until centers were established in certain sections of the city where the "high brows" are supposed to live. The other city established its first prevocational center in certain schools where business, professional and fairly well-to-do classes lived, with the result that the work has been exceedingly popular and is demanded by all classes alike. So, after all, the social stratification argument seems to be rather in favor of keeping vocational instruction in the high school.

The first reason advanced for separate schools is far more difficult

to answer. The success of vocational instruction in the high school will depend upon the insight and courage of the teachers and those engaged in high school administration. Will the teachers, the principals and the superintendents be able to overcome the "taboo" tendency which they have inherited in their own training? The domination of college requirements is rapidly breaking down. More and more, textbooks are being written by those familiar with high school problems. The number of high school teachers professionally trained is rapidly increasing. Will these teachers be able to read the history of secondary education in our country aright, and reading aright, have the courage to think and do, in the instruction of the academic branches, what they themselves have not been taught in those branches? Will they be willing to welcome vocational teachers to their ranks who have been successful men and women in industries, business, and agriculture? Will they be able to adapt their supporting branches to the needs of the vocational students? These questions must be answered "Aye" before we shall be certain of success. This question was uppermost in the minds of those who framed the New York law on vocational education (1898). The intent of the law as regards the instruction in "general industrial schools" and "trade schools" was as follows:

> The schools in question are not special schools in any sense other than that they have an especially definite purpose and a course of study fitting in with that purpose. They belong to the general school system and articulate with its other parts, but their work is not to be confused with the work of other departments, tho including much in common with them. They may properly be called either "schools," "departments," or "courses," it being borne in mind that the word "course," as here used, does not refer to merely a single line of study, but to a group of related studies forming in itself a scheme of education having a distinct vocational purpose.[1]

It does not require prolonged argument to see what would be gained by successfully uniting vocational with academic instruction in the same high school. Either side of high school instruction would be sterilized because of the absence of the other. The vocational students need the opportunity to choose supporting lines of information which the cosmopolitan high school alone can offer. On the other hand, the students pursuing academic lines need the opportunity of electing vocational branches even if taken for avocational purposes. Both classes of students need instruction in the social branches which will serve as a central corps of constants for all.

[1] 25th Annual Report of the Commissioner of Labor, 1910. Industrial Education, p. 107.

Under the separate vocational school system the tendency would be and is to provide the minimum of supporting branches, such as hygiene, community civics, possibly United States history with the emphasis upon industrial history, English composition, arithmetic, writing, and spelling. On the other hand, the manual training in the high schools would become less efficient than it is at present because the student desiring vocational instruction would attend the vocational school. The result would be that the students preparing for college would lose the opportunity of securing even a good imitation of industrial experience. Lastly, the separate system, owing to the necessity for duplication of plants, much apparatus, and machinery, supporting subjects and teaching force would be more expensive. This would be especially true in all places except the larger cities.

To summarize the reasons for maintaining cosmopolitan high schools which shall include vocational instruction we conclude: First, such high schools would provide greater educational advantages in all lines of instruction; second, they would be more democratic; third, they would be less expensive.

SUGGESTIONS BASED ON STUDY OF CONDITIONS

To make our problem more concrete let us consider the introduction of vocational intsruction in a city of approximately 30,000 people.[2]

An analysis of the occupations in this city shows that the existing branches in the high schools could be so modified and extended as to give training for nearly all of them. By consulting the accompanying diagram the reader will be assisted in understanding how the various departments would have to be expanded to meet the needs of the several vocations represented. For example, in addition to the training given in bookkeeping, stenography, commercial arithmetic, commercial law, etc., which fit the student for general office work, it would be necessary to introduce courses in salesmanship and business management. These would require the service of a first class salesman with experience in selling several kinds of goods. An intelligent man or woman of such experience could be trained to teach much more quickly and efficiently than the ordinary teacher could be given the necessary business experience. Again, this division of the commercial department would amount to little unless it were given as a part-time course. Classes of boys and

[2] Based on a vocational survey of Bellingham, Washington, recently conducted by the writer.

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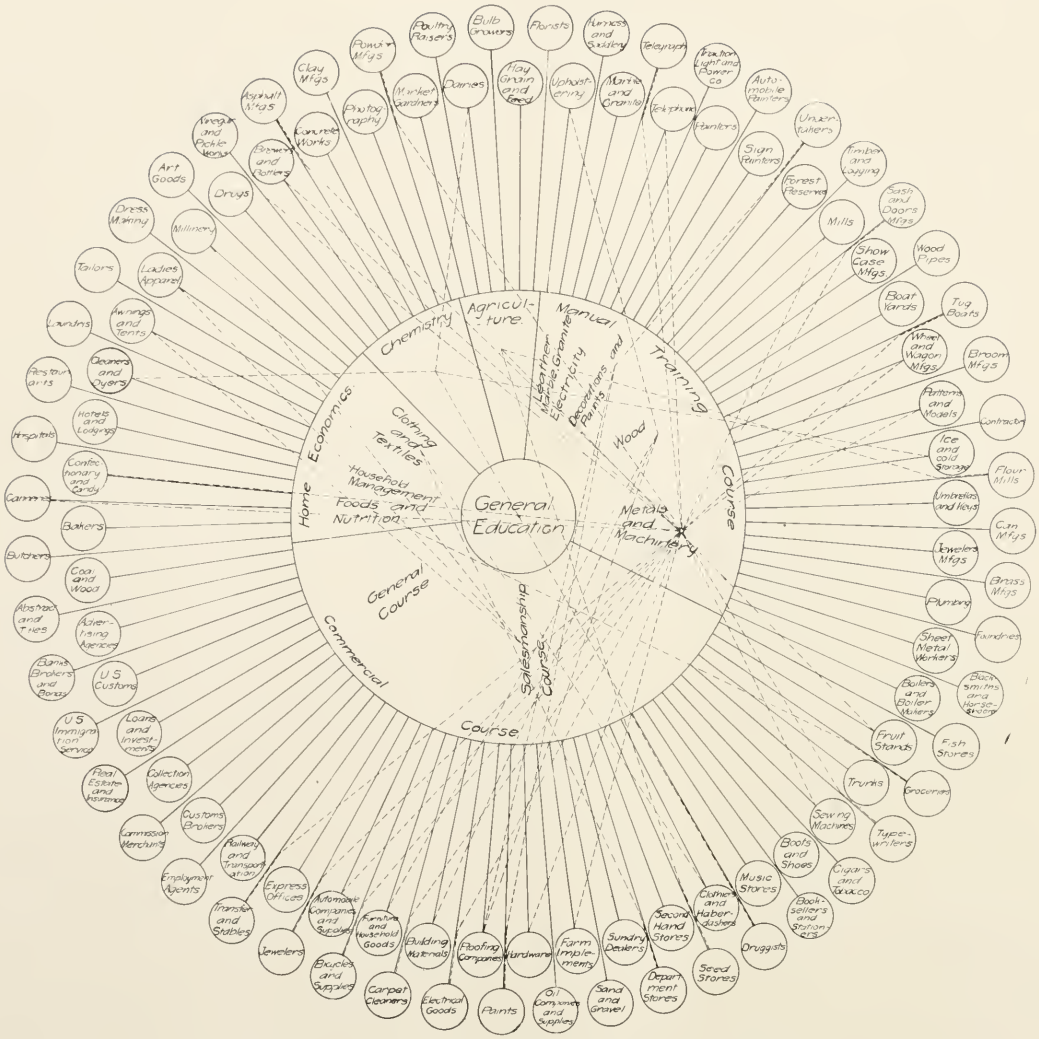


RELATION OF HIGH SCHOOL DEPARTMENTS IN BELLINGHAM, WASHINGTON.

girls between fourteen and eighteen years of age who are engaged in salesmanship would be formed and given instruction for, say, not less than six hours per week. Classes of men and women above eighteen years of age who are engaged in salesmanship would be formed and given instruction at least three evenings a week. Full-time instruction for general office work would, of course, be successful as it is at present, but part-time courses could well be given for those who are engaged in office work. However, a certain amount of general commercial training and study is usually needed before the actual work is taken up.

By tracing the lines on the diagram, connecting the commercial department with the various occupations, it will be seen how very important this department will be in organizing a system of vocational education in this city. Every enterprise which manufactures, sells, or buys commodities, requires some phase of commercial training.

Manual training in this city may be expanded into several different phases of vocational training. By giving work in wood, metals, and simple machinery, pupils could be prepared to pursue any one of several different vocations on the part-time plan. There are at present thirty or more enterprises which would be benefitted by vocationalizing the manual training department. Here, as in the salesmanship division of the commercial department, the part-time plan is the only practical plan of operation. It would be impossible to bring the various kinds of mechanical operations performed in these enterprises or industries into the school. However, the manual training department could furnish the technical knowledge required. The manual training teachers could teach the fundamental operations of the industries and give some actual practice in the school. For example, a simple machine-shop could be installed. Machine-shop training prepares workers for the departments requiring skill of a large number of industries. The second most important division of the manual training is the carpentry or woodworking shop. As vocational education develops, however, more and more of the actual work will be done in the industries themselves, and the manual training department will furnish the technical knowledge.

The manual training teacher should be an extension teacher. He should go out to the industries and study not only the operations performed, but also the operations needed. He should observe the boys at their work. Questions of economy in operations; strength and quality of materials; service rendered by the manufactured article; strength, mechanical advantages, and capactiy of machines used, etc., etc., should arise. The same principle applies here as in the salesmanship division

of the commercial department in selecting the teachers. They should be highly trained and intelligent mechanics with broad experience and capable of rapid development as mechanics and as teachers.

The home economics department should be divided into at least three main phases of vocational education; first, that which deals with food and nutrition, and which trains in the planning, cooking, and serving of meals, diet for the sick, etc.; second, that which deals with textiles and clothing, preparing for textile work, sewing, millinery, laundry, dyeing, etc.; the third phase deals with household management, and prepares for work in the home, hotels, and restaurants. On the other hand, dressmakers, tailors, milliners, and launderers need just such technical training as could be given in the work now offered with a little modification in the method of teaching.

The work in the fine arts branches, by placing the emphasis of instruction upon design, would help to prepare costume designers, milliners, interior decorators, wall paper and textile designers. Drawing is fundamental in a large number of occupations. It is needed by the stone cutter, the ornamental plasterer, the wood carver, the designer and maker of furniture and light fixtures, and the house builder. It is needed by those who are to become draftsmen in architects' offices, engineers' offices, in commercial advertising companies, and by illustrators in newspaper work.

At present there is no agricultural instruction in the high schools, yet were it given in connection with the market gardens, bulb farms, and dairies it would be important, and more so as the city grows in population and as the local market develops.

ORGANIZATION OF VOCATIONAL DEPARTMENT

All of the above departments should be organized into one big department to be known as the Vocational Department. Outside of the Vocational Department there should be a well organized group of supporting subjects modified to meet the needs of the vocational students. Very important among these subjects would be hygiene of the vocations, as well as personal and social hygiene, chemistry adapted to the needs of home economics and several of the manufacturing industries; physics related to the work with machines and electrical construction. The courses in history and civics for vocational students should be profoundly modified. There should be practical courses in economics and social problems introduced. Very important modifications should be

made in such subjects as botany, zoology, and physiology. English composition should utilize the vocational content.

It is undoubtedly true that there are many vocational needs in this city which cannot be satisfied by the existing departments or branches, or by any extension or modification of the same, but to fail to use the equipment and resources of the high schools as they now exist would be economic as well as educational waste.

There are two characteristics of the occupational situation in this city which seem to offer difficulties in organizing a system of vocational education. First, the industries which employ large numbers of workers require adult male laborers only, as, for example, the sawmills, planing mills, sash and door factories, wood pipe factory and concrete works, the large fishing canneries and can factories being the exceptions. There could be no day part-time system organized in connection with these industries which do not employ boys or girls of the high school age. While the canneries employ boys and girls it is only for the canning seasons and there is little or no opportunity for future advancement in this seasonal work which is also largely unskilled work. In so far as this is true this industry may be classed among the "blind alley" occupations for boys and girls. Therefore these boys and girls should be trained as soon as possible for some other occupation which offers future advancement. Altho from twelve to fifteen per cent of the positions in this industry require skill and offer fairly steady employment very few boys and no girls of high school age are desired in this part of the work. The second characteristic of the occupational situation in this city consists in the fact that a very large percentage of the business and industry is conducted by one, two, or three persons, i. e. enterprises in which the owners do all of their own work.

These difficulties, however, are not insuperable. Let us consider them in order. First, there are many opportunities for part-time work for boys in the various smaller industries of the city which train to some extent for future positions requiring skill in any kind of mill, cannery or can factory, wood pipe factory, concrete works, etc. Machine-shop training is fundamental in preparing for positions in any industry. There are several opportunities in the city for part-time work in wood, iron, steel, and machinery. The girls of high school age could work part-time in connection with the various mercantile establishments. Secondly, there is no reason why boys and girls should not be trained for their parents' businesses as well as for those of others. In fact, the small en-

terprise should furnish an additional opportunity for vocational training over the large. At least this would be true in the early stages of the work. The boy may not only be trained on the part-time plan to perform the work in his father's business but may share in its direction and conduct.

STATEMENT OF PROBLEM

In establishing vocational instruction in this city, as in any other, there are four important problems: First, to furnish sufficient vocational experience in the industries that are constant for all cities, and in the industries peculiar to the given community; second, to furnish the requisite technical knowledge of both classes of industry; third, to provide instruction in citizenship, hygiene, and supporting subjects; fourth, to give as far as possible to every vocational student the opportunity of electing subjects of avocational interest to him.

In conclusion, it is worth while to consider from another angle the permanent effect which the introduction of vocational instruction into the present high school will have in vitalizing secondary instruction. We have seen how all other new branches have been gradually taken over into academic seclusion. In every case, however, the new branch has become exclusively a school branch completely nurtured and controlled by the school. Vocational instruction, however, is nothing, if it comes completely under the direction of the school. It cannot be successful unless home, industry, and labor join with the school in the undertaking. This very necessity will be a powerful factor in breaking down the insulation between school and society. All vocational teachers will have a direct responsibility to other intsitutions than the school, and in the united system of vocational and academic instruction this sense of social responsibility will extend to the teachers of academic subjects. In this way the high school will increase its social efficiency.[3]

[3] Much of the material of this article is drawn from a recent vocational survey of Bellingham, Washington, made by the writer in connection with his work on the State Vocational Commission.

VALUE OF MANUAL TRAINING

ROBERT H. RICHARDS
AND
HENRY TURNER BAILEY

We are glad to print the following stenographic reports of two addresses given at the annual dinner of the Boston Manual Training Club. This dinner has come to be regarded as one of the most important events of the year in the manual training fraternity. It would seem that thru its speakers this year the club was especially fortunate in the connecting of past achievements with hopes for the future in manual training. Its speakers were from both the East and the West—Dr. Richards, professor emeritus at the Massachusetts Institute of Technology, James F. Hopkins, director of art education in Massachusetts, Ben W. Johnson, director of manual arts in the public schools of Seattle, Wash., and Henry Turner Bailey, editor of School Arts Magazine. The following extracts are from the addresses of the first and last of the speakers mentioned above. We print them with the "fireworks" left in.—The Editor.

ADDRESS BY PROFESSOR RICHARDS

MR. PRESIDENT and Gentlemen:—I feel a good deal like a fish out of water to-night. If you would have asked me something about separating lead from quartz, copper from quartz, separating gold and silver, I could probably talk to you for hours—perhaps for days without looking into a book, but I hope that before I sit down, I can say something which you will be glad to have heard.

Mr. Brodhead said, in referring to me, that I may be able to tell you the changes that have come about since the early days. It is true that I have had a little to do with manual training in the early days, and was greatly interested in it. I have had the honor of being president of the Eliot School, to which Mr. Brodhead has alluded. In my position there I knew Mr. Broadhead, Mr. Emerson and others so well I do not have to be kept posted for they bring to me statements of what needs to be done, and the trustees vote on it, and in that way the Eliot School has been able to be of some use in this movement.

It would be foolish under the circumstances where I have been so much of a one-idea man, devoting myself to ore dressing so closely as I have, to try to make suggestions about manual training to you who know a great deal more about it than I. I think that when I did know something about it, we felt that manual training, compared with the academic work, was really practical experience compared with book

knowledge. Perhaps I can best make my point clear by giving you two or three instances of experiences of young men. We can classify boys ranging from the very bright and willing down to the dull and hopeless, and put in as many steps between these as we wish. I will use fictitious names in two of these instances. I will call this first man by the name of Cass.

I think Cass entered Technology very poorly. Indeed at the end of the first year he got the maximum number of failures that a man could possibly get and still be allowed to remain in the school. At the end of the second year he got the same and when he entered the third year, he was allowed to continue in three subjects only, and in two of these he had to make good at the end of eight weeks or drop them. He did drop them. I had many interviews with him. In one of these I said, "How did you get on?" He replied that he thought he got along all right. I said, "Do you expect, now that you have only one subject, that you are going to be able to pass the final examination at the end of the year?" "I think so," he said. I knew he was not going to pass. When the semi-annual examination came around he got the lowest mark that was ever received for work in the school. Of course that put him out. In the routine of the Institute, there does not seem to be any way to save a boy of that kind.

I wrote to his father, who was living in the West. I said, "You must take your boy and put him in a mine. After he has worked in the mine a while, he will probably see the need of these subjects in which he has been failing, and when he does he will be able to do something." His father wrote back that he could not do so, as the young man's mother was very sick with nervous prostration and his coming West would kill her. He said, "You must take care of him in Boston." Accordingly the Institute staff agreed to try a private tutor. The tutor set him to work on practical professional subjects, instead of trying to have him trained in mathematics, languages and the other subjects which we consider very important; he started him in on minerology and assaying, and later, mining and metallurgy. The minute the boy got on to the professional subjects he blossomed out beautifully. When he left us later, he got a place immediately in one of the Western smelting places and made good.

The next instance is not so long a story. I will call this man Wilkins. He could not do anything with mathematics. A private tutor was tried, but in vain. He could not make good in any of his lessons. A little later he became interested in boats for rowing and sailing. He

very soon found in some of the boat work that he required some mathematics. He immediately took hold of the mathematics that he needed in that work and mastered it with ease, showing again the need of presenting the practical side of the subject.

I will now tell a story about myself. I entered the Phillips Exeter Academy and was preparing myself for Harvard University. I was at the foot of the class with another fellow. He had the foot of the class one month and I the next. I could not understand why we were studying Latin and Greek, and lacking that comprehension, my work was useless. I was not ripe to understand the beauties of language, of history and of literature—what men were thinking about thousands of years ago, and what they were doing and how they were doing it—fascinating subjects to the people who are ripe and are able to follow these subjects. I was not ripe for these subjects. My partner, according to the latest accounts, was selling beer over the bar. I will not say that I would have done the same thing, because my family was too strong and would never have allowed me, but if I had not had a strong friend to rescue me I would have gone into that or something similar.

Fifty years ago this coming February, my mother wrote to me saying, "Professor Rogers is just starting a new scientific school in Massachusetts; wouldn't you like to come to it?" I had no idea what Massachusetts Institute of Technology was or who Professor Rogers was, but I took the first train—I think I came down that very afternoon—I do not think I remained to say good-by to the principal of the school. (Laughter.) I entered Technology and immediately began the modern training. In the very beginning there were only six pupils, and I made the seventh. We had three rooms on Summer Street opposite Hovey's Store, and one of the most striking things, as I look back to that period, was Professor Roger's laying the foundation of Roger's Building, 150 feet long, 90 feet wide, four stories high, when he had only seven pupils. We had fascinating lectures from Professor Rogers on physics and geology, illustrated in the most beautiful way with drawings and experiments. Of course we had very little apparatus at the time. We had chemistry with Professor Storer; we had a chemical laboratory. We had only one retort among seven. If we could get a hand on it once in a while we were happy. This new method of education completely captivated me and instead of having to be dragged to my books I had to be dragged away from my books.

Having painted myself as such a ninny, I will say a word or two about one or two of the latest things that have come to pass thru

the researches that have been made by me and my associates at Technology. One large company out West has just been putting in some improvements,—wonderful concentrating apparatus for concentrating sands and for separating copper, gold and silver. The improvements which have been put in as a consequence of our studies have saved a million of dollars a year that formerly went to waste. There is another case of where they have put in improvements for treating the very finest of slimes, and these improvements are saving—are actually saving a million dollars a year. The plant cost $300,000 and paid for itself in two months.

There is a certain likeness which exists between all of the above instances. In the case of Cass, the gap between zero and intellectual salvation was between the theoretical side of engineering and the practical side. In the case of Wilkins, he could not get at the theoretical side of mathematics at all until he had the need for mathematics. In my own case the gap was between dead languages and modern engineering education. As soon as I left dead languages and went over into modern engineering education, my mind opened up and became intelligent. I am inclined to liken these to an external motor or motive. When the motor is outside and tied as tug boat to a barge, it has little effect on the barge, except to pull it. The barge is then an inanimate thing, and has no ability to do of itself. I take it that the boy who is trying to learn, but does not know what or why he is learning, is something like the barge, except that he is not getting anywhere while the barge is. The boy who has a motor or motive in himself is in a condition to go anywhere he pleases, and do anything. He is self-contained and able to accomplish results. It seems to me the idea of an internal or external motor has something in it that may be interesting to you in your work for the boys. If there is any way to transfer the motor from outside to inside the boy the victory is won. Manual training in many cases helps to do this.

ADDRESS BY HENRY TURNER BAILEY

MR. PRESIDENT and members of the Boston Manual Training Club. Last year Mr. Broadhead told me something to say. This year I am in the condition of the farmer who was taking some sugar beets to the railroad, and who lost the tailboard of his wagon, and consequently had gradually lost the beets without knowing it. As he neared the station he had to pass thru a low run where

there was a good deal of sticky clay, and just as he got into this muddy portion of the road, his mule refused to go. He urged the mule to move on by every means possible, but without success. The farmer rose and looked around to see what to do next, and then discovered that his wagon was empty. "By George," he exclaimed, "Here I am stuck and nothing to unload." (Applause.)

But after hearing three such addresses as we have heard, a man ought not to be quite in that position. And I am going to express my opinion in favor of what the three previous speakers have said. I want to call your attention to what they have said in its most concise form.

Mr. Hopkins made this one point, it seems to me, that manual training had vitalized school work. There was a tremendous need of that. The schools had dealt altogether with language,—language and mathematics,—mostly language, even in mathematics! (Laughter and applause.) Pupils of the age of elementary children get, as a rule, very little from words. There is for them often nothing behind the words. For example a boy was asked, at the close of a lesson on the care of the body, what he would do if he got an obstruction in one of his ears? He said "I would blow in my other ear." (Laughter.) Had the physiological words meant anything to him? Take another case. A teacher said to a boy, "Describe the palate." He replied "If you will look into your mouth, you will see a little piece of meat hanging down. It is the palate. It shuts up your nose while you swallow everything." (Laughter.) But perhaps words meant something to that boy. He may have been right! I notice everything has been swallowed here to-night. Another boy in a lesson in physiology was asked by the teacher to describe the brain. He said, "The matter of the brain is that it is gray. It is full of little fishes and ducks. (Laughter.) It is divided in two halves—the front half works days and the back half works nights. (Laughter.)

Mr. Hopkins' point is well taken. Manual training has put reality in the place of words. It is a very easy matter if you are dealing with spelling, or mathematics, or even with drawing, if you make a mistake to hastily erase it by one sweep of the eraser. You cannot correct your mistake that way if you have cut a piece of wood a quarter of an inch short. The thing has a certain tang of reality that the other studies do not have. If the boy failed to pass in language or mathematics, he could appeal to his teacher, or if necessary, to the superintendent of schools, or as a last resort, his father could appeal to the school board, and the boy

might get by somehow with a certificate of promotion. But if the boy makes a force pump that won't work, he cannot make it work by appealing to anybody. He has to face his failure, and take the consequences. There is a reality here that he has to deal with himself. One of the chief values of manual training is that it gives this reality to the boy in place of vague words and figures.

The second chief value of manual training was emphasized by Professor Richards. It finds certain types of boys and girls and makes possible their development, types that were absolutely unprovided for in the old school. You have there, it seems to me, another tremendously significant reason for having manual training in schools. You could all add to the examples cited by Professor Richards, but it is unnecessary.

Then third, and lastly, I want to second what Mr. Johnson has said about the importance in all our school work of considering primarily the needs of the individual boy and girl. I have just come back from that big meeting down at Richmond, Va. I have followed the work of that society rather closely since it was organized. Some of the things that were said at Richmond were very significant, but the most significant thing to me, I think, was the fact that there is, at the present time developing in that organization a suspicion, and it is not much more than a suspicion, that there may be a question as to the wisdom of educating boys and girls merely to suit manufacturers. There may be a mistake in doing that. They expressed no doubts on that point a year or two ago.

We are not to train boys and girls merely to be more efficient in manufacturing, in vocations, merely for the sake of their task-masters, and in skill merely that their bosses may earn more. We are to train boys and girls for their own sakes. We must not consider solely the jingle of the dollar. We must do exactly what Mr. Johnson has said to-night. We must train them to be efficient in living. We must never forget the necessity of vision; of training the boy and girl not for what they can render in immediate value to the various industries, but the necessity of training them also so that they shall have a life of the right sort; so that they shall be able to enjoy the great things of life; the intellectual and spiritual treasures of the race. The more grinding our corporations become the more important it is for us to give to every boy and girl, music and fine art, and a love of nature, so that they shall find life worth living in spite of the grind into which they have to go. (Applause.) We have got to teach them the important things. We have got to teach them that the immortal spirit within them may be

wealthy and free. We have got to teach them that it is fatal to blind that giant and bind him to grind in the prison house of the Philistines. We have got to give them vision. That is the point that Mr. Johnson made.

If we can take away from this meeting these three convictions: that (1) we must put reality into every problem that goes into every public school; (2) make people see the importance of the new forms of discipline for all, and especially for individual boys and girls with a bent toward the arts and sciences; and (3) hold to the high ideals, that we must give to all our pupils visions that will lead them to live a large and abundant life in spite of what industrial conditions force them to do for a living, we shall go away from this meeting greatly enriched with power, and become of inestimable value to the communities in which we teach. (Applause.)

IN ALL INDUSTRIES THE CHIEF ELEMENT TO BE CONSERVED IS THE HUMAN ELEMENT; AND THE TEACHER IS PAID BY THE STATE TO UNDERSTAND, GUIDE AND GIVE A RIGHT START TO HIS QUOTA OF THOSE BOYS AND GIRLS WHO ARE TO BE THE PRODUCERS, DISTRIBUTORS AND CONSUMERS OF THE COMING TIME.—James P. Monroe.

INTRODUCTORY PROBLEMS IN MACHINE DRAWING

J. Calvin Nicholson

THE series of problems here begun is the result of an attempt to make up a special course in drawing for some fifty apprentice boys all working in one shop and hoping eventually to become machinists. These boys varied greatly in previous education, ranging from those who had attended only a country school or were below seventh grade to those who had graduated from high school and had spent a year at college. Some were in the last year of their apprenticeship, some in the second, a number in the third, but by far the greater number had been in the shop less than three months. They all had two hours a week in class, one on their own time and one on the company's; and the greater part of this time was spent on drawing, tho the problems in this and subsequent articles do not embrace all that was given them during the year which the school lasted.

Clearly the material to be used in teaching these boys could not be merely of a general nature but must be closely related to their work in the shop. Such being the case, it cannot be expected that the problems designed for a special purpose will be equally satisfactory for high school boys. Yet the writer has used them with fair success in high school work during the present year and there are reasons why they may interest others.

Perhaps it may be safe to assume at the start that no matter where a teacher finds his class, it will always have in it some of the very brightest boys and some of the very dullest. Such a condition is a burden which all teachers are not only bound to bear as best they can, but which they must meet resolutely with the aim to give both the best student and the worst student what is best for each. Yet the work cannot be wholly individual; rather must the course present a wide range of material, the simplest of which illustrates the prime requirements at each step, and the more difficult of which may even now and then jump over into more advanced fields. As an illustration of this principle the series to be presented may have general interest.

It will be noticed thruout that the first page of each set of plates has on it a very brief explanation of what is required. This of course is entirely inadequate, yet brief as it is, it still saves the teacher's time

and voice. All the plates require paper 10 by 14 inside margin lines, and this paper should be at least reasonably good, since it is intended that inking shall begin with the first plate. For the purpose of interest alone this seems to the writer abundantly justifiable.

Plate I is not included in the present series for the reason that, like the first plate of most courses for beginners, it had to do with acute angles which are more difficult to ink than are the right angles of Plate 2. Moreover to begin a course by a mere exercise designed to teach how to draw all the different angles possible with the square and triangles anticipates a need before it actually arises in experience and is, other things being equal, the surest way of causing the pupil to forget what has been gone over. Rather let the method of drawing angles be left till occasion calls for it later and let the entire attention be concentrated on the fewest possible essentials at the beginning. It is the writer's belief that it is even better to dispense with the board and square at the start and to use only pads of cross-section paper and a pencil, doing all the work freehand, and later inking it freehand with pens suitable for varying thickness of lines. By this means one may begin at once with the very meat of almost any course of drawing, namely the relation of the three views. After a careful explanation of this let the student be supplied with say a dozen straight line objects shown in perspective which he is to draw in orthographic projection (dodging the big words) on the cross-section paper.

It is very important just here, however, that even these freehand drawings be placed centrally on the paper. To require this in every case is perhaps the very surest way of compelling the student to review and apply the rules for the three views at the beginning of every drawing. Moreover, the application of a little simple arithmetic is entirely too valuable to be slighted. The writer begs leave to emphasize this point. It is perhaps safe to say that almost anybody can add and subtract passably well, *but to know when to add and subtract* and to know it so well that one never fails to do it when occasion demands it—that is a knack which even our best education has thus far failed to furnish the man of tomorrow. And the same may be said of almost any other subject. How *can* we teach the boy of today to become the resourceful man of tomorrow?

After doing the problems on cross-section paper and becoming able to make recognizable figures and letters, the class may take up Plate 2 of the present series, using the board, square, and triangles, which should

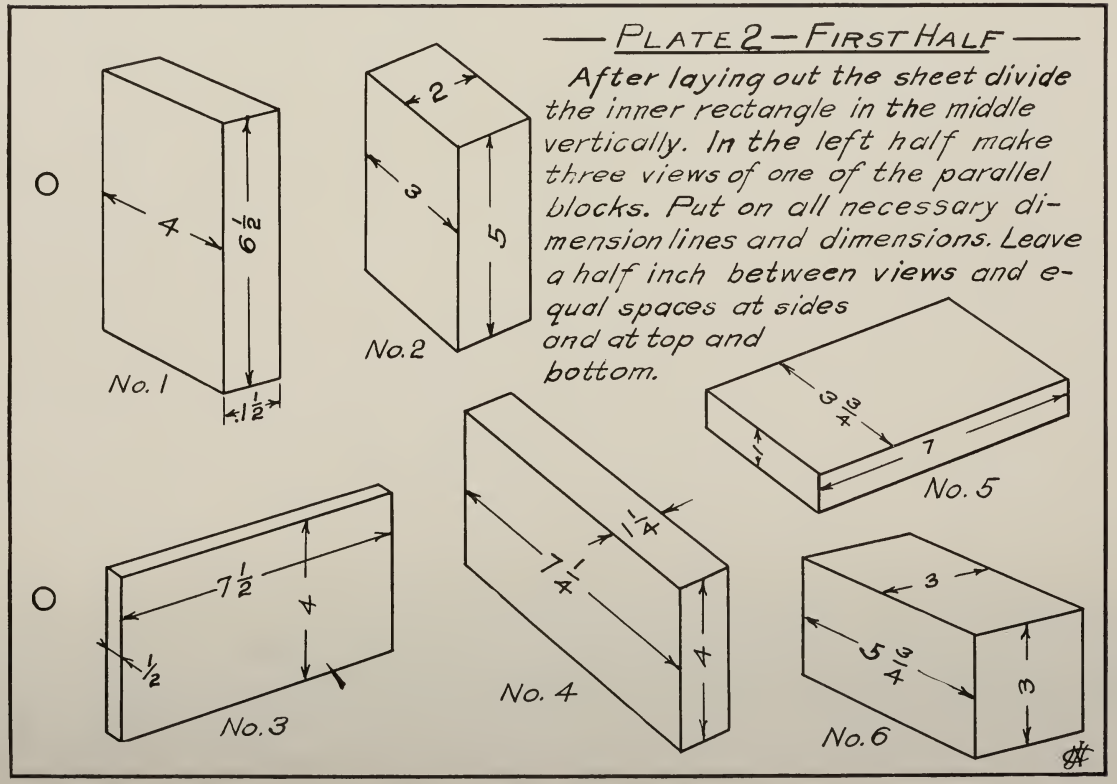


PLATE 2—FIRST HALF
After laying out the sheet divide the inner rectangle in the middle vertically. In the left half make three views of one of the parallel blocks. Put on all necessary dimension lines and dimensions. Leave a half inch between views and equal spaces at sides and at top and bottom.
No. 1
4
6 1/2
1 1/2
No. 2
2
3
5
No. 3
7 1/2
4
1/2
No. 4
1 1/4
7 1/4
4
No. 5
3 4/16
1
7
No. 6
3
5 4/16
3

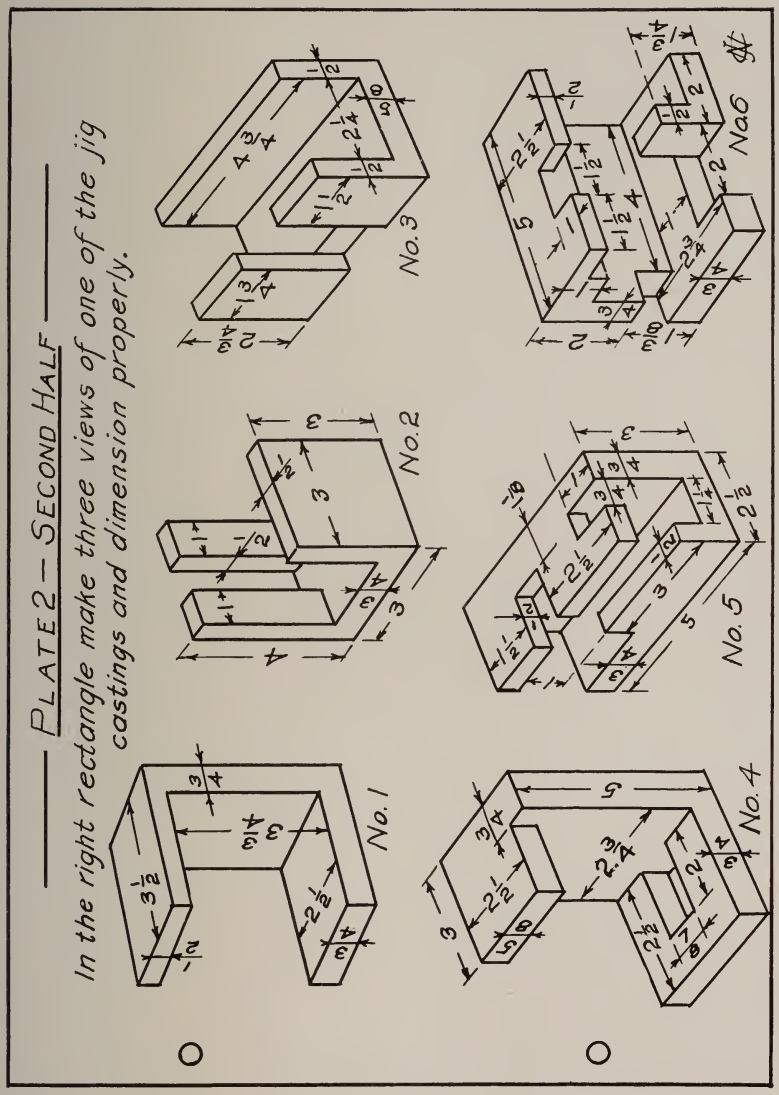


PLATE 2 — SECOND HALF
In the right rectangle make three views of one of the jig castings and dimension properly.
No. 1
No. 2
No. 3
No. 4
No. 5
No. 6

now be carefully explained, confining the explanation to horizontal and vertical lines and the proper way to use the square and triangles in drawing them. Even the names of the two triangles may well be omitted. It goes without saying, of course, that the lay-out of the sheet should be given in demonstration and that the pencils should be properly sharpened by each student.

In Plate 2 and in some subsequent plates the drawings when completed appear somewhat crowded on the sheet. The object in this is to compel thought in putting on dimensions and in many cases to compel the student to turn the object in some other position than that suggested by the perspective. In the first half of Plate 2, for example, only problems 1 and 2 may be drawn as suggested by their position in perspective; that is, with the longest dimension vertical, which would be the only desirable way of placing them in the 7 by 10 rectangle formed by dividing the sheet in the middle vertically. These two problems are for the less apt, the others for the brighter boys. It is also hoped that having a number of different problems for each principle, will prevent one boy's copying from another even unintentionally. Even more problems would be desirable.

It is necessary thruout the series of problems to encourage the student to use his own ingenuity in putting on dimensions and to caution him against slavishly copying what is before him. It will often happen that a problem in perspective is not—indeed cannot be—dimensioned as it should be in the completed drawing to be made from it. The crossing of dimension lines as in problem 3, Plate 2 should always be avoided if possible. *Very few* arbitrary rules for dimensioning, however, should be given, since nearly all are more or less violated; but no method of dimensioning should ever be suggested without giving a good reason therefor. Let the student try for himself, then, if need be, let the teacher suggest a better method, bearing in mind always the temperament of the individual, and often not even attempting to correct more than a little of what is wrong, but *always* making *some* corrections if needed. And just here it may be added that when occasion demands it, every student should be taught to use the eraser industriously, patiently, and with skill. If, as may happen, a boy rebels at this, he should be shown why he must not. One may preach a whole sermon on this while quietly giving a demonstration in neat effective erasing.

The first half of Plate 2 has to do with solid lines only; the second half calls for dotted lines, the meaning of which should here be reviewed.

The problems are arranged in practically their order of difficulty. It would rarely be wise, however, to assign either number 5 or number 6, but rather save them as extras to be done by the more skillful boys. At this point also it should be made clear when to put on a dimension with the arrowheads pointing toward each other, and when not. The problems as given are no guide.

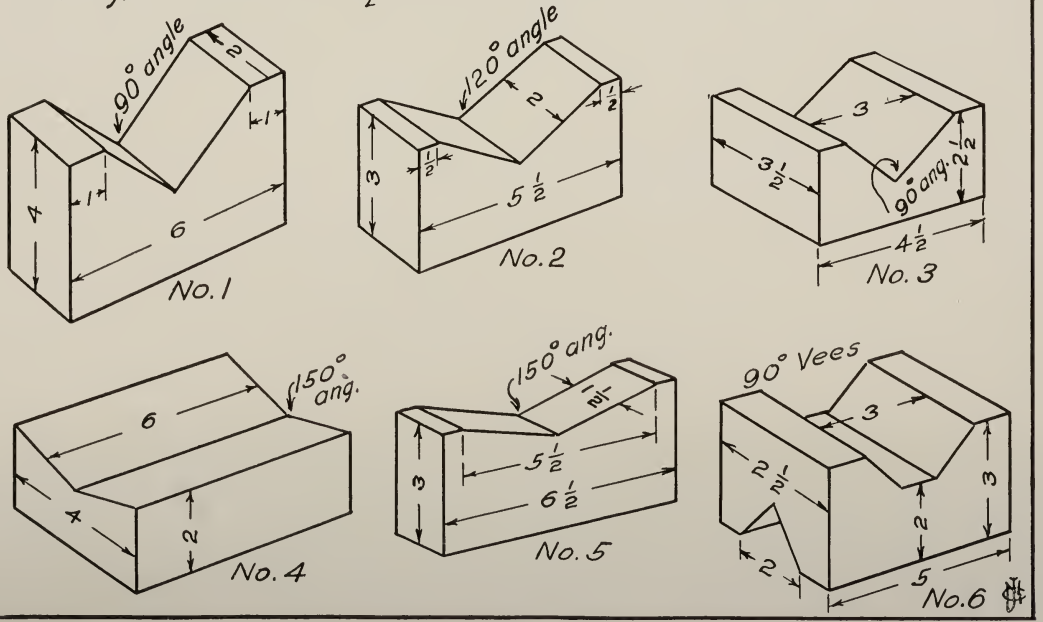
As soon as a few boys have completed both parts of Plate 2 in pencil, these boys may be given directions for such lettering as is required on the plate, and in exceptional cases may be allowed to assist other boys at this period, which will be a very busy one for the teacher. It will not be possible to wait till all have finished both parts of the plate in pencil before taking up the explanation of inking. One may be reasonably sure, however, that all have finished the first half of the plate, and every member should be directed to ink that half immediately after the explanation, regardless of what has been done on the second half. This, in fact, is one reason for having the plate in two parts. It will also happen that some of the less skillful boys will make such a mess of their first attempt at inking as to render the plate beyond redemption. If this occurs when only one half of the plate has been done in pencil, obviously it will be less discouraging than if both parts have been done.

The explanation for inking should, of course, be dwelt upon till all have pretty well fixed in mind what precautions are to be taken. Special attention should be given to the order for inking and from here on this should be insisted upon. In addition it may be recommended that the teacher adjust the pen and start each student individually, leaving with him at the time a slip of paper on which are shown the different form and thickness of lines to be used. Those who have great difficulty in inking should here be dealt with very patiently. Erasures of ink, however, are better than beginning over unless the plate is hopeless. It is well for the teacher to demonstrate this by showing how a blot of considerable size may be entirely erased and the paper left in good condition for inking again.

The third plate should not be taken up until all have finished the second unless there be some who deserve to come at an extra hour to make up for unpardonable deficiencies. But in any case all should take up the plate at the same time, the delinquents laying aside Plate 2 to be finished at extra hours and those working on extras laying them aside till they are again ahead of the class.

PLATE 3 — FIRST HALF

After laying out the sheet like plate 2 make three views of one of the V blocks. Draw the required angles by using the triangles on the T square.



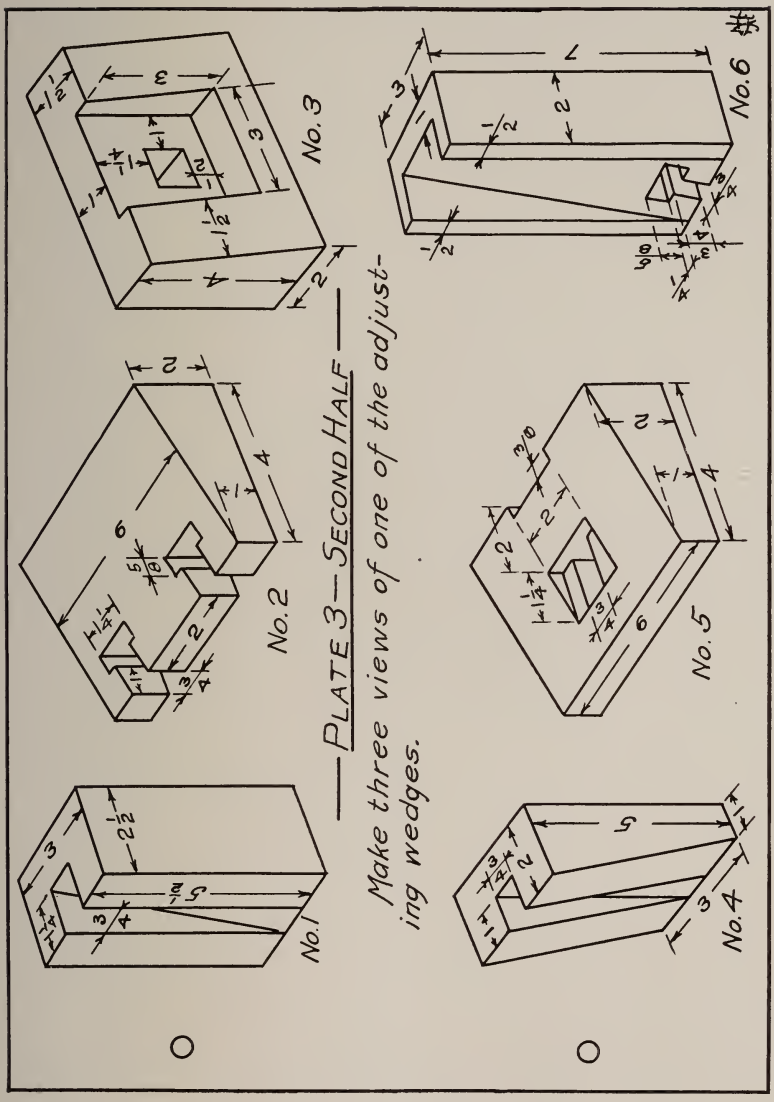


PLATE 3—SECOND HALF

Make three views of one of the adjusting wedges.

In taking up Plate 3 an attempt should be made to draw from the boys what they know about circular measure and upon this as a basis there should be a careful explanation of the triangles and their use in drawing all the different angles. Let the explanation be varied and complete, even to drawing one of the V blocks on the blackboard with triangles. Following this also each student should be provided with a sheet showing how to place the triangles for drawing different angles. Attention should be called to some part of this sheet to show how one may use it when in need of it, and all should be instructed to keep it where it can be referred to easily. It is also advised that just here great care be taken to make the terms horizontal and vertical very clear when speaking of drawing an oblique line at an angle with both, and also to remind students that every angle must have two sides.

Aside from the matter of angles the first half of Plate 3 presents nothing new. The second half, however, is more complex. Here for the first time it is well to suggest that the pupil select views that call for the fewest dotted lines. Of the problems given, number 1 is the simplest, number 5 the most complex, and number 6 the most likely to catch the brightest. The teacher will have his hands full at this point, since the problems are hard for beginners, and in nearly every case he will need to suggest which view must be completed last. In some cases it will be best even to advise the student which face to take for the front view.

(*To be continued*)

JIGS

Fred P. Reagle

THE introduction of the vocational movement into education, coming as rapidly as it has in the past few years, has had much influence on school affairs in general and has created many lively discussions among bodies of men interested in the training of youth. Specifically has this been the case in all the associations of teachers and other supporters of the older movement along practical lines in education —the manual training movement. Probably one of the strongest criticisms the manual training man has been subjected to as a result of these discussions has been that the work he offers has failed to fill the bill as vocational training because it employs the individual craft methods of work. Most recommendations for vocational work insist, further, that the typical shop methods of work be used. It is not the object of this article to enter into the argumentative side of the question —manual training vs. vocational training—since the time is past for such a controversy, but to describe a method of work which has been tried for the last two years in Montclair, New Jersey, in typically equipped, grammar grade, woodworking shops, and which meets this criticism from the vocational side. Experimentation along this line of work was due particularly to an inquiry as to whether our shops could turn out a set of fifteen tables for a special class. The state law in New Jersey requires that all children who rank three years or more below their age, as a result of the Binet test be segregated in groups of fifteen. It provides further that the schoolrooms for these groups be equipped with tables and chairs; and the absence of this type of school furniture from the market was the cause for the above request.

Such calls are not new to most of those who have been thru the mill as shopmen, and possibly the following has been the typical result. If the job is large enough to employ the entire class it is hurried thru to please the person asking it, and the results, more often than otherwise, are flimsy and fragile. If it is smaller and requires only a few boys the best are chosen, often to the disappointment of those few. In the case of many such pieces of work, the teacher makes it easier for all concerned by doing them himself. In spite of the foregoing, our shops are

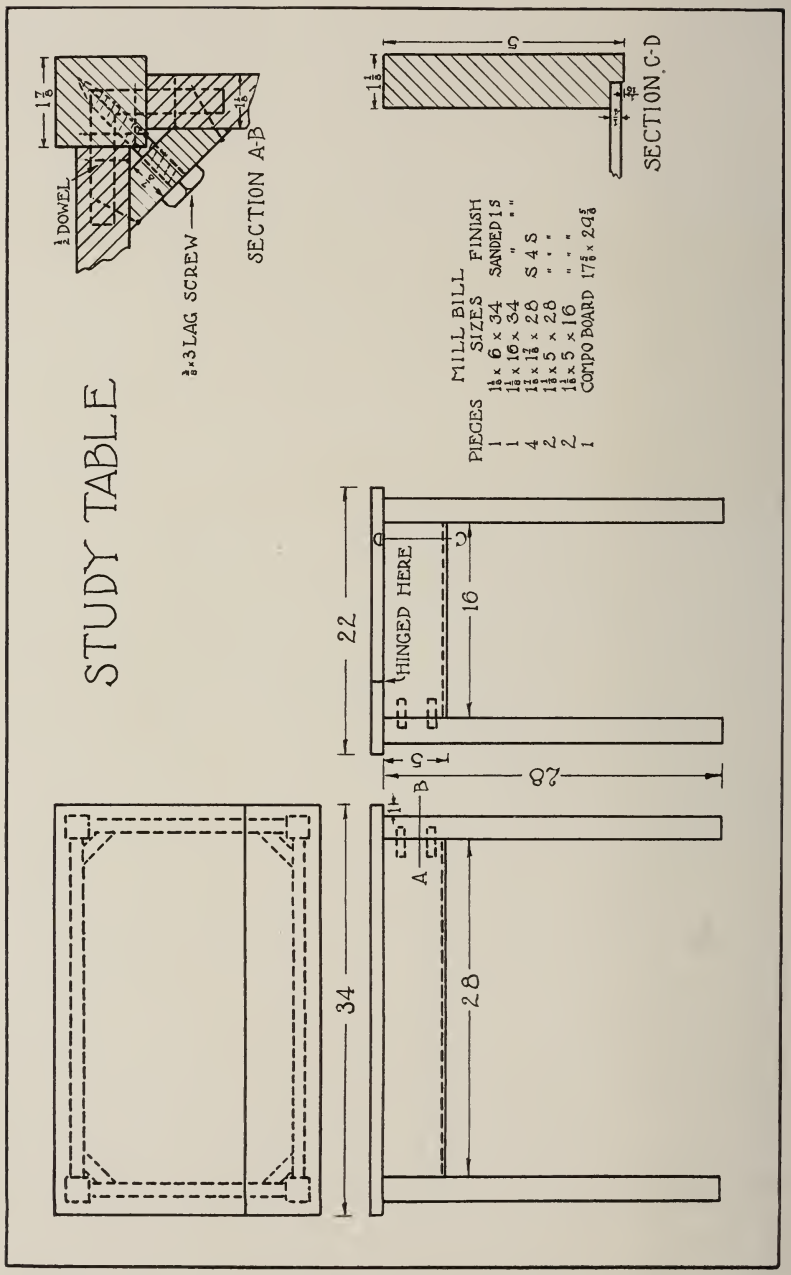

STUDY TABLE
SECTION A-B
SECTION C-D
DOWEL
LAG SCREW
HINGED HERE
MILL BILL
PIECES SIZES FINISH
1 1⅛ × 6 × 34 SANDED 1S
1 1⅛ × 16 × 34 " "
4 1⅞ × 1⅞ × 28 S 4 S
2 1⅛ × 5 × 28 " "
2 1⅛ × 5 × 16 " "
1 COMPO BOARD 17⅛ × 29⅝
34
28
22
16
27
17
5
B
A

FIG. 1

now looking for jobs to be done by classes for school buildings or for individuals, and all are happy in the doing.

It will be the object herein to describe, in detail, the construction of a set of fifteen tables, shown in Fig. 1, by a class organized on the factory or gang basis and making use of jigs. A number of other projects of a similar nature will be discussed briefly to demonstrate further

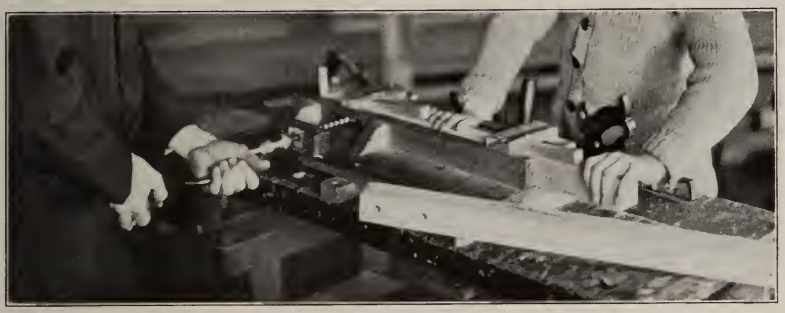


FIG. 2. JIG BEING USED TO BORE HOLES IN LEGS OF TABLES. IT BORES HOLES AT CORRECT PLACE, SQUARE WITH SURFACE AND TO THE PROPER DEPTH. NOTE FINISHED LEG IN FOREGROUND

the application of the factory idea to communal work. The organization of a class performing a piece of gang work, its lessons for all concerned, and our reasons for advocating and carrying out these projects, are subjects to be touched on, and some conclusions are to be drawn as to the spirit of the classes engaged and the reaction on the boys.

A jig is a mechanical device used in all highly specialized industries to turn out duplicate parts in the quickest and easiest manner possible. It is the device which has enabled our large plants to produce great numbers of the same object in such a way that any detail from one will fit into its proper place in any other. The automobile gas engine is a good illustration of this type of product. It is rather strange that the jig idea is not employed oftener than it is in manual training work, as thereby many of the now laboriously performed operations would be much simplified and the tool practice would be brought more into line with modern methods.

The tables under consideration were drawn up and detailed by a high school mechanical drawing class. In adopting the dowel joint for this problem, the designers considered that it was best adapted to the methods of work in question and to the tools available. Jigging each operation in the best fashion possible, offered a chance for the play of

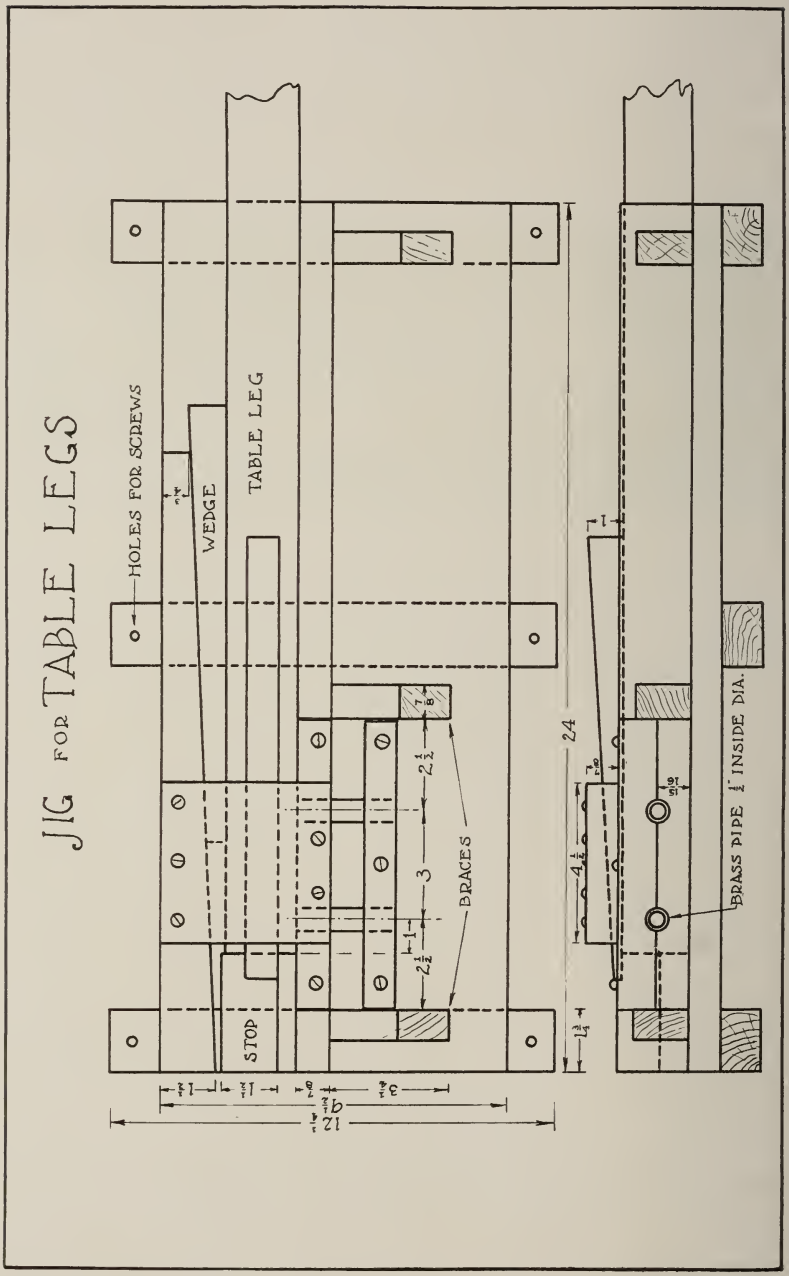

JIG FOR TABLE LEGS
HOLES FOR SCREWS
WEDGE
TABLE LEG
STOP
BRACES
BRASS PIPE 1" INSIDE DIA.
24

FIG. 3

ingenuity and invention and at the same time required a higher degree of accuracy than most shop jobs in that it was not the finished product but merely a means to an end. If the means were not carefully made the end must suffer accordingly.

Figs. 2 and 3 show the jig for boring the holes in the legs of the tables. Two pieces of half-inch (inside diameter) tubing which are

FIG. 4. BORING HOLES IN ENDS OF RAILS

accurately spaced and clamped securely in place by means of loose caps in the machine, offer the housing for the bit. This jig insures the legs being bored at the correct place, square with the surface, and to the proper depth, the latter point being taken care of by a file mark on the bit or a depth gage. To hold the leg in place, a stop is screwed on the base of the machine and wedges are employed to force the piece down as far as possible and firmly against the front. In a given time, two boys can perpare more legs by this method than the entire class can by the old laying-out process, while the grade of the finished product under the new method is distinctly superior.

The holes in all rails were bored with the jig appearing in Figs. 4 and 5. Here, again, the wedges have shown their efficacy in holding the pieces securely in place during the operation. In preparing the braces for each inside corner, the stock was ripped and planed to the correct width and then mitered on each end to the correct length by the use of miter-box and gage. The boys in Fig. 6 are performing this operation. Parenthetically it might be well to state that the stock used in this type of work was prepared: either (1) wholly by the class, or (2) partly by the class and partly s-4-s or s-6-s by the mill, or (3) entirely s-6-s by the mill.

The jig used for cutting off short lengths of $\frac{1}{2}''$ dowel, sixteen for each table, is shown in Fig. 7 and has proved very satisfactory. These

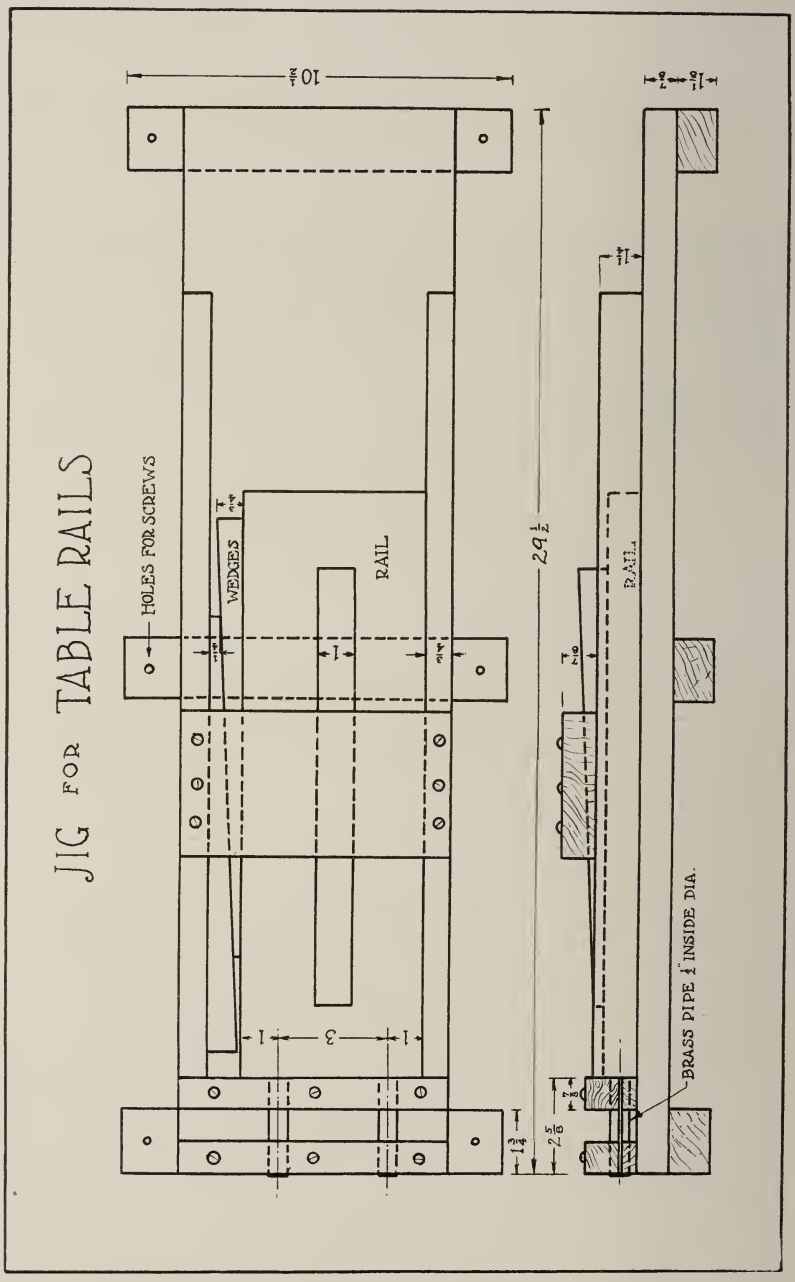

JIG FOR TABLE RAILS
HOLES FOR SCREWS
WEDGES
RAIL
RAIL
BRASS PIPE 1" INSIDE DIA.
10¾
29½
3
1
1
1¼
2⅝

FIG. 5

dowels are mitered on one end, the piece being held in place during the sawing operation by means of a lug soldered to a length of $\frac{1}{4}''$ brass.

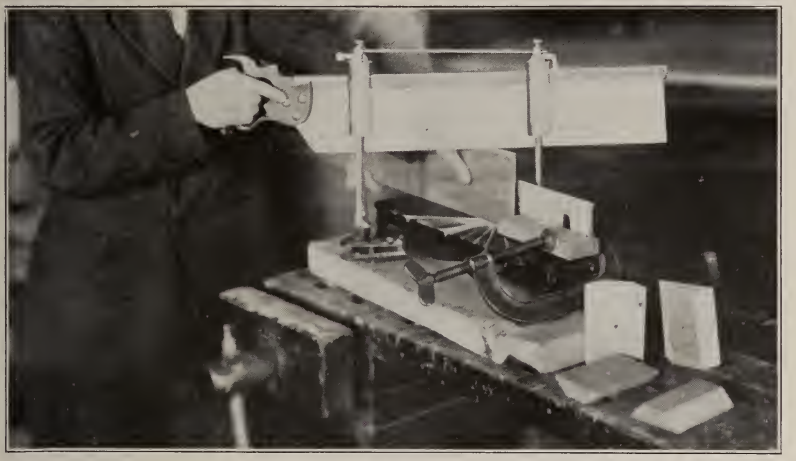


FIG. 6. USING MITER-BOX WITH STOP AS JIG FOR CUTTING OFF CORNER BRACES. NOTE FINISHED BRACES IN FOREGROUND

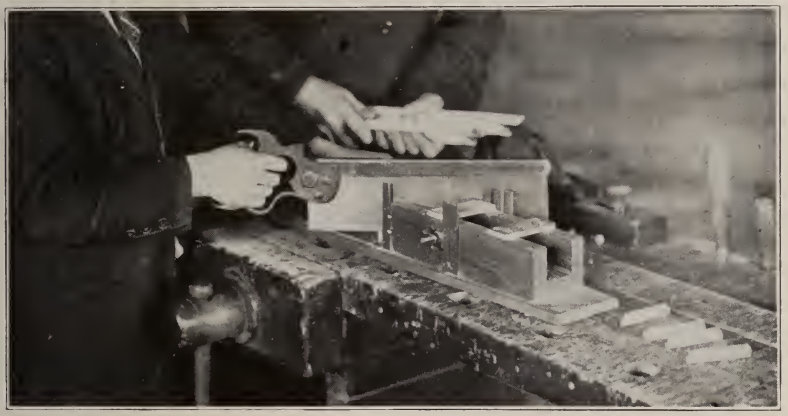


FIG. 7. CUTTING DOWELS TO CORRECT LENGTH AND MITERING THEM AT ONE END

A winged nut, threaded to fit the brass rod, supplies the pressure required to keep the dowel firm.

The boy in Fig. 8 is cutting the seats in both parts of the table-top, preparatory to placing the hinges. This operation, difficult as it is for

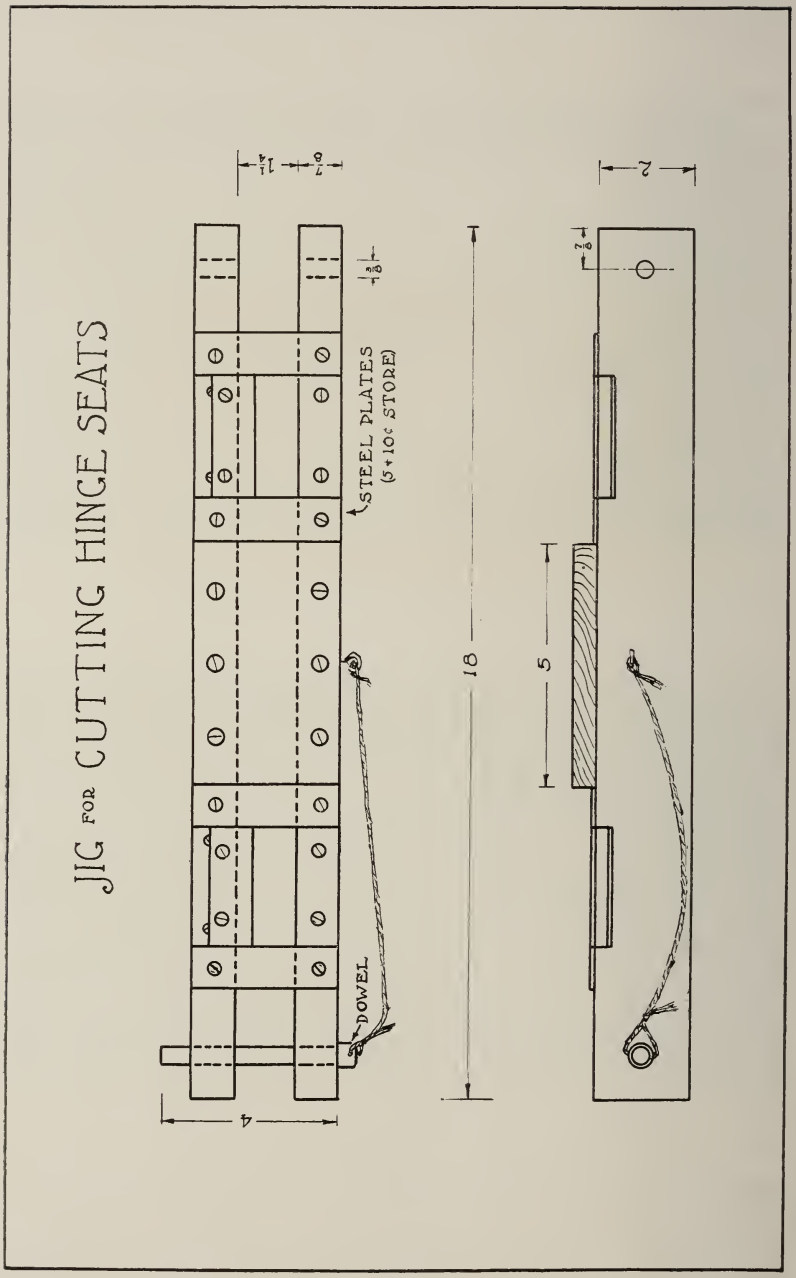

JIG FOR CUTTING HINGE SEATS
STEEL PLATES
(5 + 10¢ STORE)
DOWEL
18
5
2
4

FIG. 9

boys in the grammar grades, and even more so for younger boys, has been made easy for them all by this process. The iron guides surrounding the opening make it impossible to cut the seat to any size but the correct one. The jig, Fig. 9, only half of which shows clearly in the picture, is the same on both ends. The dowel, which fits thru both side pieces, determines the place of the hinge seat. When working on the other end of the part of the table top shown, the dowel is moved to the hole in the

FIG. 8. CUTTING OUT SEAT FOR HINGE. NOTE TWO PARTS OF TOP IN FOREGROUND

left end of the jig and the second iron-bound space is used as a guide for cutting.

In designing and jigging these tables, every effort was made to have a product as firm, stable, and lasting as could be turned out. In the first place, the $\frac{1}{2}''$ bit used in boring the holes for dowel joints was filed down so that the dowels would fit snugly into the holes. In assembling the tables hot glue was used, and in addition each dowel was further secured in place, both in legs and rails, by nails driven thru from the inside into the dowel. After the legs and rails were assembled, the corner braces were nailed on the inside of the table frames and the $\frac{3}{8}''$x3$''$ lag screws driven home. For the assembling operation shown in Fig. 10 a large group of boys can be used, and a competent foreman is needed.

A completed set of tables, Fig. 11, presents a very neat and rather novel sight in a manual training shop. These tables are complete in every detail, including stain and varnish, domes of silence, ink-wells, and fixtures to hold the tops open. A system of inspection, similar to that in vogue in commercial plants, offers some new lessons to a shop class and

completes the job so that it is ready for delivery, as shown in the picture. One hundred and ninety of these tables have been made during the last year by the method described above and with the jigs shown in the

FIG. 10. ASSEMBLING

FIG. 11. SETS OF TABLES COMPLETE IN EVERY DETAIL INCLUDING STAIN AND VARNISH, DOMES OF SILENCE, INK-WELLS, AND FIXTURES TO HOLD TOPS OPEN

pictures. About half of them were made by typical seventh and eighth grade classes, and the others by special subnormal classes. They take the place of desks in the clossrooms for subnormal boys and girls and their use makes it possible to vitalize the room for the numerous activities of those groups. The picture in Fig. 12 shows a typically equipped

room with a sixteen-foot work bench, made by the boys themselves, at the back.

The groups of projects in Figs. 14, 15, and 16 illustrate further the practicality of the factory method of work, with the use of jigs, in turning out a valuable commercial product. The twenty-five work benches,

FIG. 12. THE TABLES IN USE.

Fig. 13, were made by one eighth grade class in five months, at a cost of about six dollars apiece, including a rapid-acting iron vise. At the time of this writing, a second similar set is being contemplated in another school. They are heavy, well-constructed and rigid, and have given perfect satisfaction since September first. In addition, they have been the source of much pride on the part of the boys who made them and the school in which the work was done. A tool mark on one of them hurts the boy making it quite as much as a similar mark would hurt him on a piece of furniture of his own make, which was ready to be taken home.

The set of lockers, Fig. 14, for first grade rooms, has been made to supply the lack of desk room in those grades, which are equipped with group tables and chairs. In this job, as in that of the seventy-five bookcases, Fig. 16, made for the classroom collection of books on specific topics loaned by the public library, the jigs were somewhat in the nature of templets for giving the shape and size of pieces and for locating the holes for all screws.

Our work with jigs in subnormal classes for boys has been especially successful. The boys have been enabled to turn out for sale dozen lots

of the footstools, chairs, and sewing-tables shown in Fig. 15. The one class from which these pictures were taken, as part of their work made and delivered, before Christmas, more than thirty of the footstools. It meant for them more than the mere making, since the delivering includes the collecting and accounting and the banking of the funds when they

FIG. 13. TWENTY-FIVE WORK BENCHES MADE BY ONE EIGHTH GRADE CLASS IN FIVE MONTHS AT COST OF $6.00 APIECE, INCLUDING RAPID ACTING VISES

return to school. This gives more practical arithmetic than can ever be obtained from books. The classroom shown in Fig. 12, during about half of the time, is a veritable hive of industry, when the tables are moved back against the wall and the dozen lots of six or seven different projects are slowly moving along toward completion.

The organization of a class for a job of this kind offers numerous and interesting lessons both to the instructor, who acts as superintendent of the whole, and to the class. Our best organization has been that in which the job has been discussed by the entire class and analyzed as to the number of operations. In the case of the tables the following analysis has held:

I. Work on details—(a) legs, (b) rails, (c) braces, (d) dowels, (e) top, (f) bottom.
II. Assembling.
III. Finishing.

A discussion concerning the amount of work under each heading will bring out the fact that certain groups should be larger than others, and some warmly expressed debate is usually indulged in to decide the apportionment of workers. The foremen, designated by the popular choice of the class, have singularly proved to be the best men for their places, because they have been either the best workers or the best organizers. It has been the duty of foremen to supervise their respective operations and to act as inspectors and timekeepers. Repeatedly we have had the entire, work, according to the analysis given, on the shop floor at one time, and this has enabled the boys to see the whole process from the raw

FIG. 14. SET OF LOCKERS FOR FIRST GRADE ROOMS

material to the finished table. That it is patterned after the typical piece work of our highly specialized industries and therefore is stultifying, is not an argument against it, as each boy sees the whole of the job. To request changes of gang members from group to group is a further remedy for the great detriment inherent in piece work.

It is not the object of this paper to offer this phase of work as a substitute for all, or any type of work now being done in our elementary school shops, but we have been willing to devote to it the entire time of classes during a period of from two weeks to two months because:

(a) It offers a wholesome change from the typical craft method of work prevalent in our woodworking shops.

(b) It gives a boy an insight into the methods in use in large plants, without the drawbacks the workers in such plants suffer. If manual training is to be an informational subject it should be informational in a way the work of the world is done today, and not as it was done a thousand years ago.

(c) It enables us to get work done for our shops and school buildings and to keep everyone happy while doing it. The writer is greeted each week by members of two eighth grade classes with the question: "When are we going to begin that factory job?"

FIG. 15. JIGS HAVE ENABLED SPECIAL CLASSES, SUBNORMAL, TO TURN OUT FOR SALE, DOZEN LOTS OF THESE FOOT-STOOLS, CHAIRS, AND SEWING-TABLES

The reaction on the individual boy has been good. He has had a hand in making a group of projects any one of which is better than he could have made by the craft method. Thus the high grade of work turned out in his factory job gives him an incentive to do better in his next individual model, and so makes the factory job worth while.

FIG. 16. SEVENTY-FIVE BOOKCASES LIKE THESE MADE FOR CLASSROOM COLLECTIONS OF BOOKS

EDITORIAL

SEVERAL times during the past few years we have taken occasion to refer to the importance of insisting upon a more liberal time allowance for the manual arts if this group of subjects in the schools is to yield the expected returns on the money invested. We have also referred to the educational value of the manual arts when given a fair chance, and to the unreasonableness of expecting results deserving the name cultural, not to mention vocational, when only an hour or an hour and a half a week are given to the work. We are therefore much gratified to learn that our efforts to gather data and present the need for more time are now being followed by the work of a committee of the Eastern Art and Manual Training Association of which William R. Ward of Trenton, New Jersey, is the chairman.

Time Allowance For Manual Arts

This committee has just presented a preliminary report in which it gives the results of a questionnaire sent to directors of maunal training and a few superintendents of schools in the East and Central West. To us this question of time allowance seems to be of such vital importance in the present stage of the development of the manual arts group of subjects, and the work of this committee seems to be so significant that we quote at considerable length from their report:

The inquiries made by the committee can be grouped under four heads: (a) Assuming the entire educational program to be represented by 100, what rating should be given to the manual arts factor? (b) Where the time allowance for manual arts has been increased, what results have been observed? (c) How much time should be allowed for manual arts in order that they may fulfill their purpose in the general scheme of education? (d) What means should be employed to secure a sufficient time allowance for the manual arts?

Altho the replies to the first group of inquiries exhibited rather wide variations of opinion, ranging from 10 to 50 percent, yet there was a remarkable uniformity in the majority of replies, giving an average of 25 as the percentage of value which should be accorded to the manual arts in the scheme of general education. While the time allowance should vary considerably for different grades, as will be seen later, the consensus of opinion seems to be that the median of educational value of the manual arts in the various grades remains nearly constant.

The unanimity of opinion that an increased time allowance for maunal arts is followed by remarkably beneficial results was clearly shown by replies to the

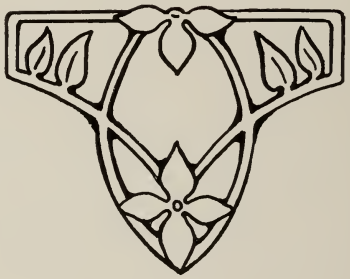
second group of questions. This conclusion is strongly supported by testimony from superintendents who have made a study of this phase of the question in connection with regular classes, as well as with classes of retarded and over-age pupils. Indeed the statements made regarding this feature of the investigation display a marked spirit of enthusiasm. A few replies will verify this statement: "Pupils wake up and do 75 per cent better work," "Aids discipline," "Intensified interest in other subjects," "A quicker start to those who go to work." Experiences with subnormal or defective pupils have not been considered in this report.

The answers to the third inquiry relate to the four divisions of school pupils; primary, intermediate, grammar and high school. The greatest variations in opinion as to time allowance appear in connection with the primary and intermediate divisions, ranging from 60 minutes to 420 minutes for primary, and from 60 minutes to 300 minutes for intermediate. The average of all answers, however, approximates 180 minutes for primary and 150 minutes for intermediate grades. The primary grades were designated as those from one to four, while the fifth and sixth were noted as intermediate grades. Replies relating to time allowance for grammar and high school grades show much more uniformity of opinion. The average of all answers for these two divisions approximates 240 minutes for grammar grades and 330 minutes for high school. Assuming that the school week consists of 1500 minutes, it is evident then that so far as this investigation can be said to give expression to their views, the opinion of the experts in the manual arts calls for an allotment of time for manual arts in the various grades as follows:—primary 12 per cent, intermediate 10 per cent, grammar 16 per cent, and high school 22 per cent.

The fourth general topic of inquiry apparently touched a responsive chord awaiting an opportunity to give expression. The replies were spirited, and almost unanimous along three distinct lines of thought, viz: (a) lengthen the school day; (b) curtail academic non-essentials; and (c) closer correlation with academic subjects. Two other means finding somewhat general expression were, (a) "adopt six-and-six plan of school organization," (b) "systematic and organized effort on the part of all organizations of manual arts teachers to advance the educational value of that subject."

The committee further state that while many appeals for increased time for the manual arts have been made by individuals, it is doubtful whether any previous effort has secured an expression of opinion from a sufficiently large number of leaders in the work to justify its use as a median, or norm of time allottment for the manual arts in a scheme of general education. While it is obvious that the facts and opinions collected by this committee, as well as the conclusions drawn from them, cannot be considered as a final expression on this important subject, they certainly are indicative of present thought, and have special value on that account. Manual training teachers and all who appreciate the value and significance of handwork in education cannot

afford to let pass unutilized this favorable time for discussion and action on this question. Its importance can hardly be over-estimated. Not until manual training has a time allowance on the school program equal to that of the most favored subject can it prove its true value, and not until then should comparisons of results be made critically. As pointed out by the committee, "the criticisms directed against the manual arts subjects and their effect on the general scheme of education today are practically nullified when reduced to terms of time allowance." And certainly the hope of the future with reference to the manual arts in the elementary schools rests in a very large measure upon more favorable decisions in this matter of time allowance.—C. A. BENNETT.

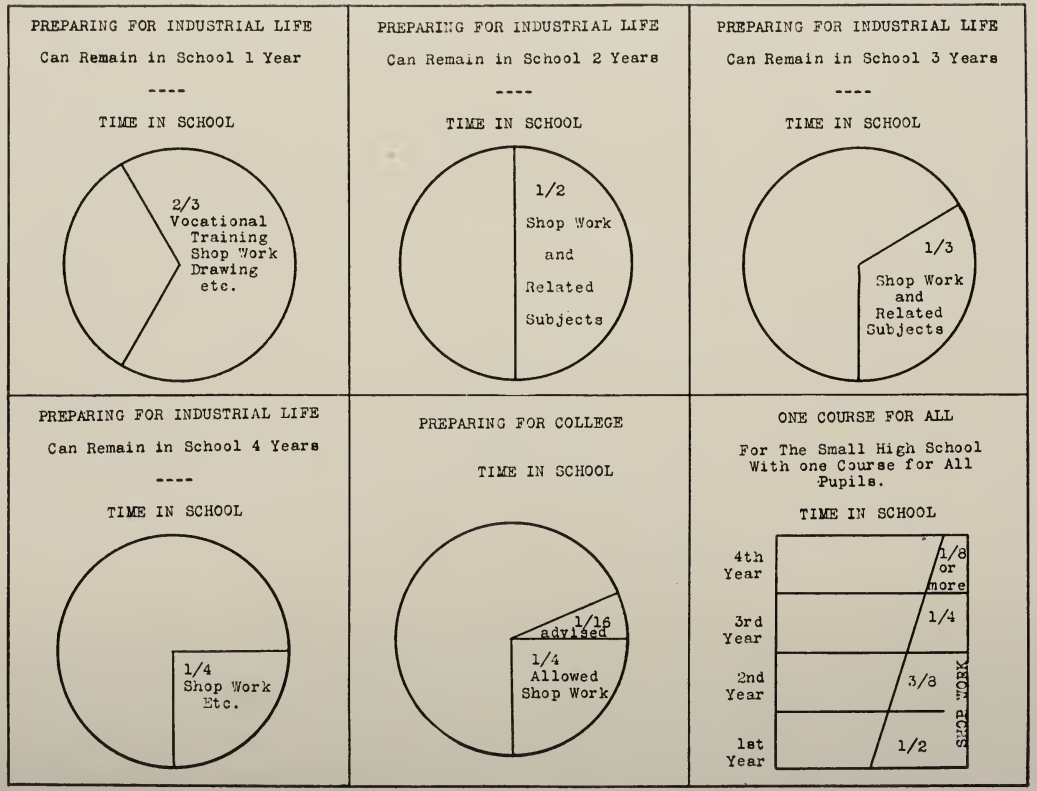


OF CURRENT INTEREST

IN JULY, 1910, in the city of Boston, the department of secondary education of the National Education Association declared that "manual training, commercial branches, music, household science and art, agriculture, etc., when well taught and thoroly learned are worthy of, and justly entitled to, recognition in college entrance credits." At this same meeting a committee of nine members on the articulation of high school and college was provided for and Clarence D. Kingsley was made chairman of the committee. In their first report, made at San Francisco in 1911, this committee recommended that four units out of the fifteen for college entrance be reserved for "mechanic arts, household science, commercial work, and any other kind of work that the best interests of the student appear to require." In 1912, at Chicago the committee recommended the appointment of twelve subject committees, including one on mechanic arts, one on home economics, one on agriculture and one on business, and that sub-committees under each subject be appointed. The recommendation was adopted and Professor Frank M. Leavitt of the University of Chicago was made chairman of the subject committee on manual arts, and Miss Amy L. Daniels of the University of Missouri chairman of the committee on household arts. At this meeting, also, the original committee and the subject committees were constituted a Commission on the Reorganization of Secondary Education with Mr. Kingsley as chairman. The report of the sub-committee on manual arts was made last summer at the meeting in St. Paul. In the discussion which followed, Professor Wilson H. Henderson of the University of Wisconsin presented a series of charts bearing on the time distribution for students wishing to go directly from the high school into industry. At the meeting of the department of superintendence in Cincinnati in February these charts were made the basis of an address by Professor Henderson answering the question, "To what extent and how can a high school, especially in a small city, teach a trade such as cabinet-making?" We present herewith the charts and the following extracts from the summary of his address:

HIGH SCHOOL PREPARATION FOR INDUSTRIAL LIFE

It is assumed (a) that the pupil has had shopwork in the elementary school or elsewhere; (b) that he has a fairly definite purpose in attending high school



ILLUSTRATING THE PROPORTION OF TIME TO BE DEVOTED TO VOCATIONAL SUBJECTS
BY VARIOUS GROUPS OF PUPILS

and knows approximately the amount of time which he can devote to his secondary schooling; (c) that he wishes to study cabinet-making seriously for the purpose of acquiring *marketable skill or knowledge of the craft.*

One issue should be met squarely: Boys under sixteen years of age are not desired in industry, and placing them there will entail serious economic loss both to the boy and to society. It is therefore recommended that no boy under sixteen years of age be admitted to the one-year course and that no boy under fifteen be admitted to the two-year course. (See accompanying charts.)

It is obvious that the first four of these charts are all that need be considered in the present discussion. Interpreting the first four charts in terms of school periods we have the following schedule: It is assumed that the school day is at least six hours, or eight 45-minute periods in length, and that the school year is forty weeks. In the one-year course we recommend that at least two periods, and preferably three, be devoted to academic work—English, history, civics, physical training, etc.

In the one-year course, 760 class periods may be devoted to shopwork and 240 priods to drawing. In the two, three and four-year courses 1280 periods may be devoted to shopwork and 320 to drawing. The one-year student will have a larger proportion of time devoted to drawing since it is essential that a good mechanic shall be able to read and interpret working drawings, and we have regarded 240 periods as the minimum to be devoted to drawing.

Our purpose is now to present a scheme whereby a high school may attempt to teach a definite occupation to the various groups of pupils in this allotment of time.

The trade or craft of cabinet-making has been chosen for discussion since woodworking and cabinet-making is the line of shopwork most commonly taught in high schools, and is perhaps in greatest demand. It might also be said that it is one of the most difficult trades to teach in a school, since so much of the work must be done on machines, and the trade is so minutely subdivided. The machines used in commercial cabinet-making contain sharp knives which are revolved at high speed, making their operation quite dangerous. In many states persons under 16 are forbidden by law to operate woodworking machinery. This is another reason for not admitting boys under 16 to these courses.

It is not recommended that every high school attempt to teach the cabinet-making trade, but if the school attempts to teach this trade or craft, this course is recommended as one which will contribute directly and in no small degree to the vocational efficiency of the pupils:

(a) Hand woodworking tools—uses and care—including saw filing and the making of joints used in cabinet-making. 150 hours.

(b) Furniture and cabinet construction, including some wood-carving. 310 hours.

(c) Woodworking machinery—installation, operation and care of. 100 hours.

(d) Gluing, including sanding and veneering. 100 hours.

(e) Wood finishing. 200 hours.

(f) Upholstery and carving. 100 hours.

The division of time for each group of subjects or processes is merely suggestive and is not given as a fixed amount of time. It seems however, that this proportion is fairly correct.

The following machine equipment is the minimum required for teaching the elements of cabinet-making: Band-saw, universal saw table, jointer, grinder, foot power mortiser, planer, lathe, foot power shaper.

Desirable additional machines:—Boring machine, power mortiser, sander, swing cut-off saw.

Wood finishing, upholstering, and wood-carving may be considered as trades in themselves, and in the one-year course, these may be omitted. If, however, the student shows a decided preference for one of these lines of work, it might be well to allow him to specialize in it.

We do not agree with those who believe that the best method of training a mechanic is to place him at manufacturing a commercial product with no systematic instruction whatever. We see on every hand evidences of the inefficiency of instruction of that character in the shops. We do not feel that there is essentially any educational value in the mere manufacture of a marketable product. If the making of a commercial commodity is of such great value educationally, why the objection to the factory as a place for educating growing children?

Instruction should accompany the introduction of each new process. By this we do not mean a series of abtsract exercises, and neither do we mean the total exclusion of exercises. To illustrate: If any of us wished to learn to wipe a joint in order to install a bath tub in our homes, we would not attempt at once to learn joint wiping by wiping the joint required in the installation of the tub. We would not expect the first attempt to be an unqualified success and if we did, we would be disappointed. We would probably take two pieces of scrap lead pipe and do our practicing on the scrap material. When we had become sufficiently expert, we would then apply what we had learned to the commercial job. This same method should be followed in the making of wood joints. When it becomes necessary to use a mortise-and-tenon joint in the construction of a cabinet or other piece of furniture, we should have an exercise on mortise-and-tenon joints.

The same method should be used in teaching drawing. The drawing should be taught by the making and reading of simple shop drawings, in preference to the exercise or copy methods. Drawing has been called a universal language, and in the teaching of a language we do not begin by teaching the use of punctuation, capitalization, rules of syntax, etc., but we give the pupil a vocabulary by reading and speaking simple compositions. We do not expect the beginner to learn to read by repeating unintelligently a masterpiece. So in drawing, we should first give the vocabulary of shop drawing practice by having the pupil use the conventions of drawing in the making of simple shop drawings.

We do not maintain that a boy completing this course will be graduated with sufficient skill and experience to immediately enter industry as a journeyman cabinet-maker, but he will be able to immediately earn a good living wage, with sufficient skill and experience to immediately enter industry as a journey-

manship. This boy will be in a position to help himself to advance to higher and better positions than the one he takes immediately after completing his course.

High schools cannot and should not expect to graduate journeymen, able at once to occupy the highest positions possible for a mechanic to fill. Our graduates should develop and advance for years after completing their schooling, and should always be preparing themselves for the "next" promotion. We do not want to place them at the top of the ladder with nothing to aspire to, but we should place them on a ladder with the ability and the ambition to climb up.

SCHOOL FIELD AND GARDEN CLUBS

Busy indeed, are the rural school children of Cook County, Illinois, who have been banded together by Edward J. Tobin, superintendent of schools in that county, to form School Field and Garden Clubs. The members of these clubs are rural school children, both boys and girls, who are over ten years old. They rent from their parents a plot of ground that must not exceed one acre, tho one-tenth acre, 160 square rods, is the recommended size.

Mr. Tobin has divided the county into five sections. In each section lives one of his co-workers, a man who is not only a teacher but an agricultural expert. These experts are called "country life directors." Thru frequent visits they supervise the gardens of the children.

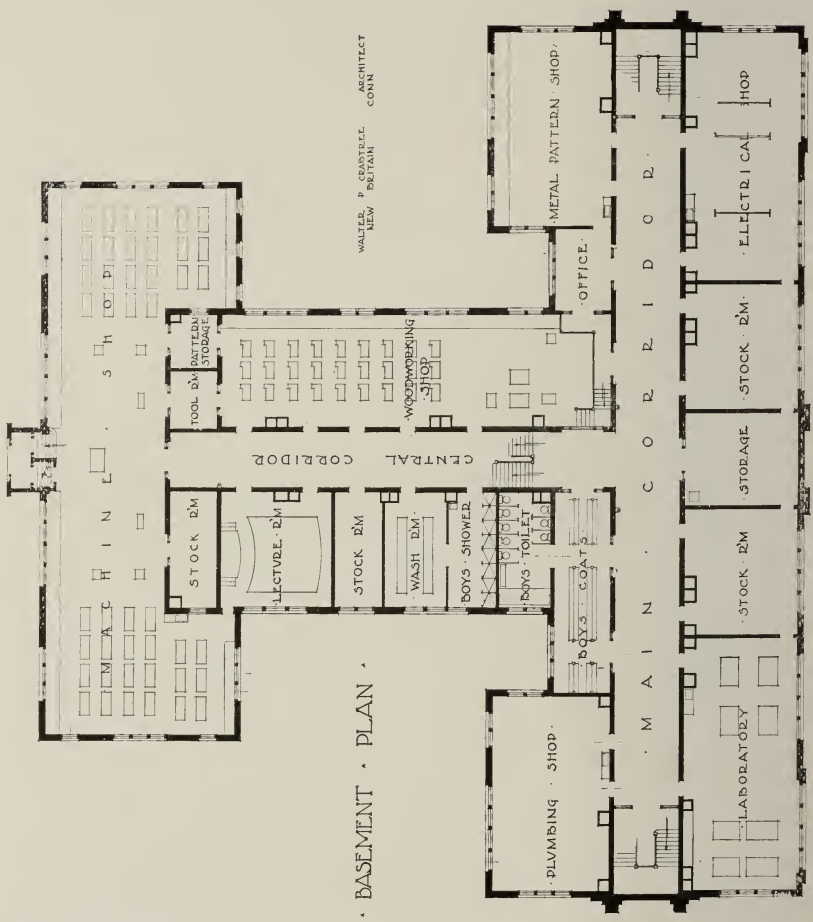
After the location of the plot has been decided, the pupil stakes it off and draws a diagram to be filed with the country life director, who before accepting it verifies the measurements. Then comes the serious question of what to plant. The children study the market to find what is in demand. They are urged by the directors to consult their parents who know not only local market conditions, but the producing powers of the plot of ground in question. In a small circular sent to the children they are cautioned, "Do not plant anything your father does not think you should, for you will need his advice from the beginning to the end. Help on this problem can also be obtained from the director, who will furnish you with a list of products that are now grown profitably in your vicinity. *You* can grow any product that any other pupil in your neighborhood can grow." It is one of the rules of the clubs that the adopted sign-board must be placed on the garden plot of each club member. The children make this themeslves. They plane a piece of wood to 12x18 inches, and paint it white. After cutting a stencil from a pattern, they letter the following with black paint: "Member, Cook County School Field and Garden Club."

Each child keeps an itemized account of all receipts and expenditures and also records dates of planting, transplanting, blooming, etc. These reports must be kept up to date for the inspection of the country life director on his visits. When the season is over, every pupil makes an illustrated booklet 9x11 inches entitled, "How I Made My Crop." This is done for the director. Into it the child copies his report for the whole season and any other items of import. In one summary of these reports it is interesting to note that garden truck is the usual crop from these small farms of a tenth of an acre or less, and that generally two or three kinds of vegetables are planted, tho a few of the farms are so highly specialized as to produce only one kind. The summary also shows that out of thirty children five had gardens of 100 square rods or more. The rest range from this to 2 square rods. But the column of "Net Profits" gives the most interesting facts. Four amounts of profits stand out because the numbers reach the third place: $138.26, $134.35, $127.40, $127.35. The first two and largest profits were made by two boys of twelve who devoted their gardens to one product, the first planted 100 square rods with onions and the other, 80 square rods with tomatoes. The other two big profits were made by a girl and a boy, who each raised parsley, onions, radishes and asters on plots of ground of 16 square rods. The girl was twelve years old and the boy fourteen. The profit made by these two children was the largest in proportion to the size of the garden. According to the rules of the clubs the profits belong to the pupil, but must be banked, loaned, or expended as the parents direct.

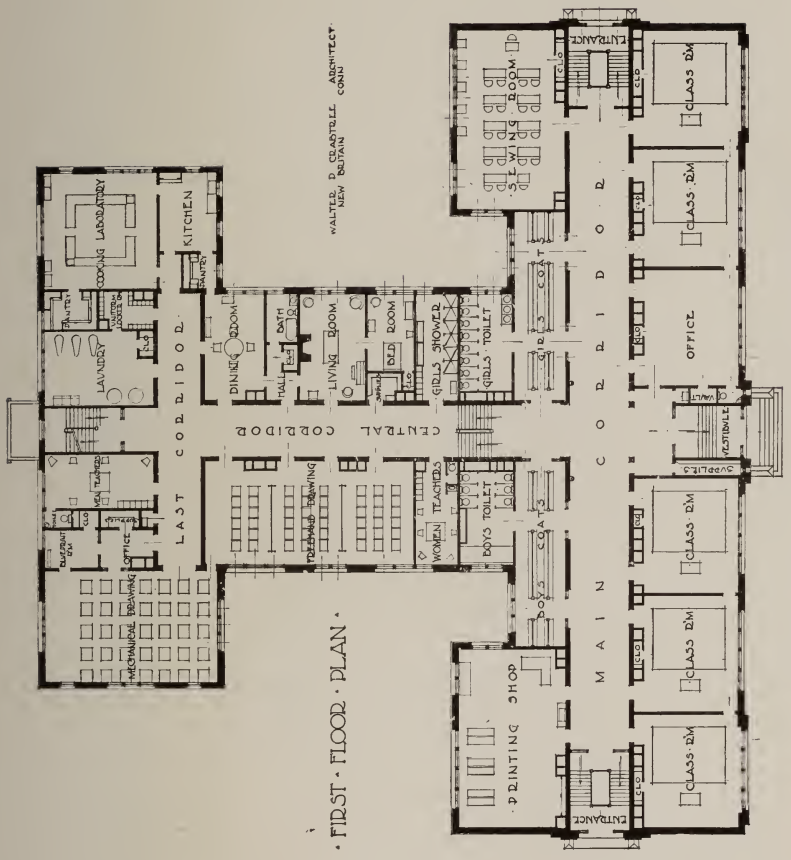
At least once a year, Mr. Tobin publishes a magazine, called *Achievement* which is devoted to the interests of these School Field and Garden Clubs. In it are printed the best of those stories written by the children entitled, "How I Made My Crop." In it also are the names, post-office addresses, crops grown, square rods cultivated, expenses, gross and net receipts, and a list of those winning prizes. The magazine is illustrated with photographs of the children and their work taken by the different directors. A complimentary copy is sent to each club member.

Thru the earnestness of these "little farmers of Cook County," as they have been called, and the enthusiastic cooperation of the parents and the rural teachers, the clubs have increased till it is estimated that during the summer vacation this year there will be from three to five thousand club members. To meet this situation twenty traveling teachers will supervise this extension work in agriculture.

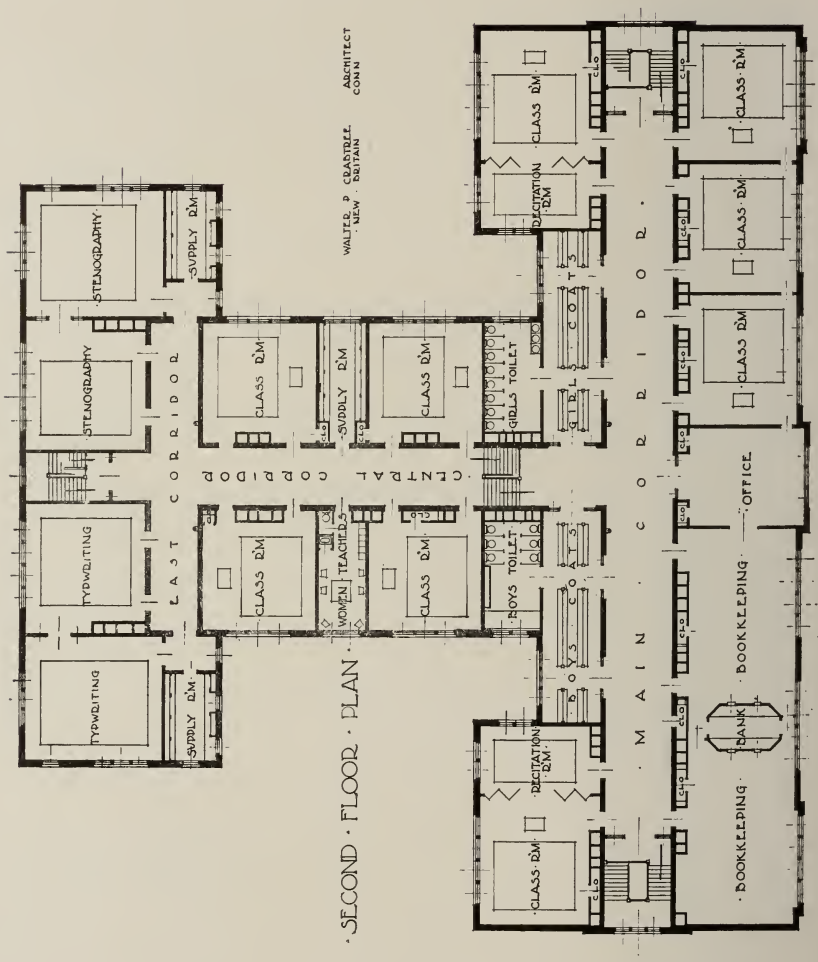
VOCATIONAL HIGH SCHOOL, NEW BRITAIN, CONNECTICUT, TO BE OCCUPIED IN THE FALL 1916



VOCATIONAL HIGH SCHOOL, NEW BRITAIN, CONNECTICUT



VOCATIONAL HIGH SCHOOL, NEW BRITAIN, CONNECTICUT



VOCATIONAL HIGH SCHOOL, NEW BRITAIN, CONNECTICUT

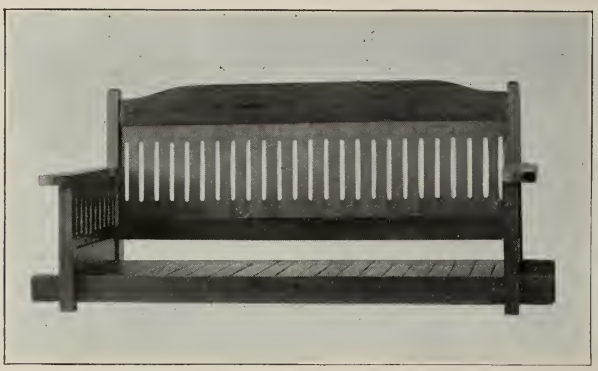
WILLIAM L. DICKINSON HIGH SCHOOL, JERSEY CITY, N. J.

SHOP NOTES AND PROBLEMS

ALBERT F. SIEPERT, Editor

PORCH SWINGS

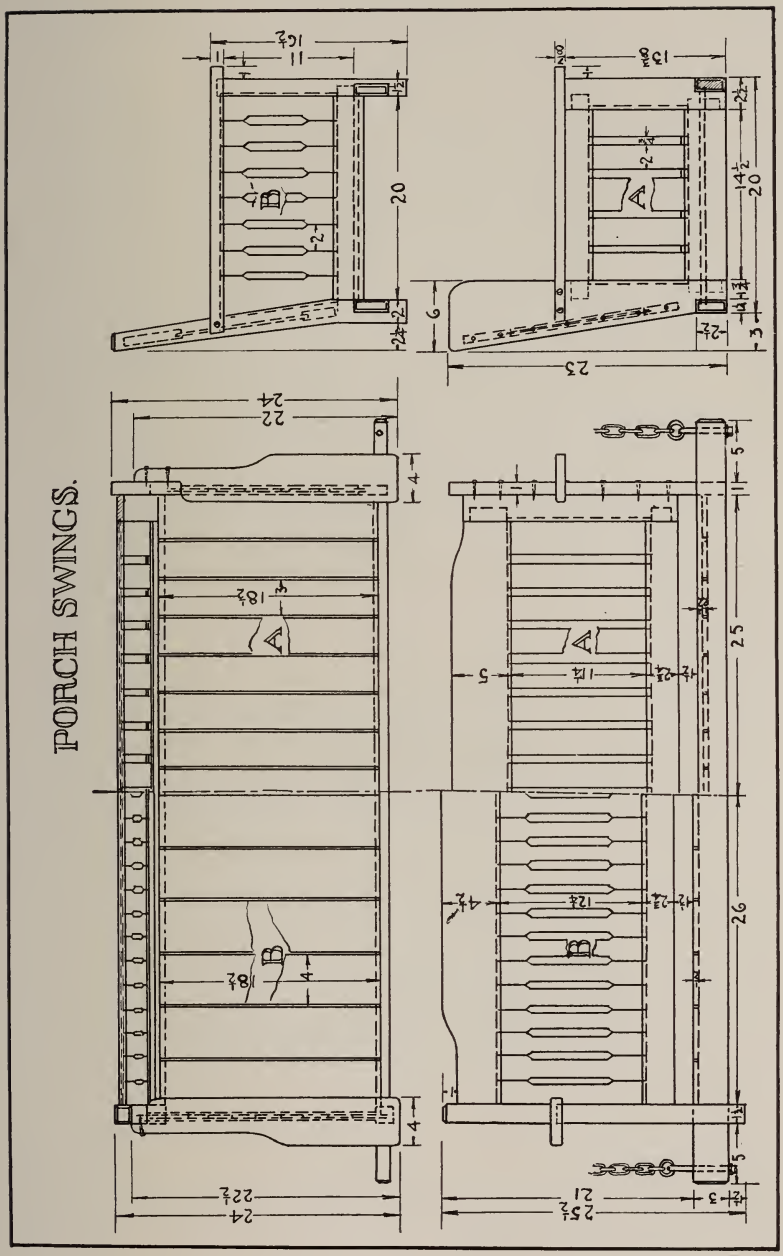
Swing A is made in sections, the back, ends, etc., being assembled with mortise-and-tenon joints after which the parts are fastened together with round head screws. The slats are set into grooves and spaced with short pieces of dowel, half of which show above the groove. Swing B has the rails directly mortised into the legs. In this case the slats almost touch each other, the edges being chamfered or rounded to prevent splinters. The seat of A is lowered to hold the cushion in place while that of B is set flush with the upper edge of the rail, and in intended



to be used without a cushion. Both of these swings were designed by A. L. Jordan. He designed B at the Cleveland East Technical High School and A at Bradley Institute, where he also made A. The photograph shows the swing made of quartered white oak.

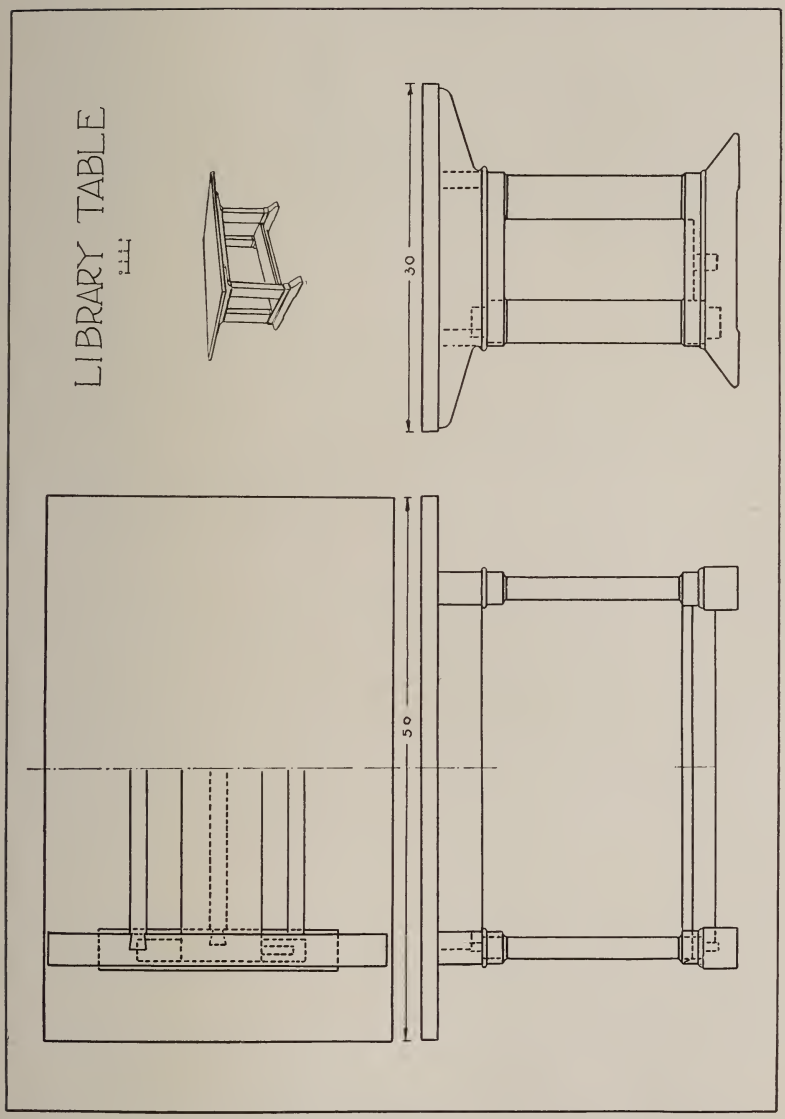
LIBRARY TABLE

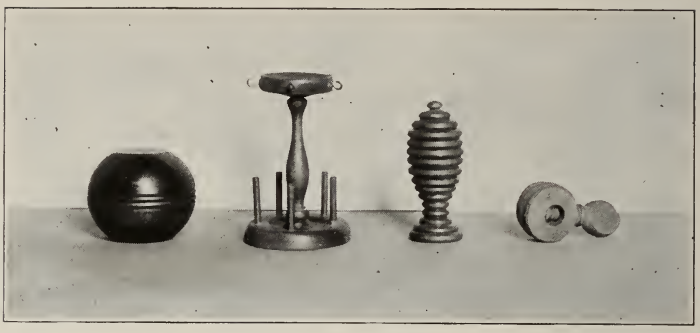
The drawing shows a project designed by the writer in the classes of L. A. Warner at Teachers College. The two ends are made of glued-up stock, the legs being mortised into the upper and lower pieces as indicated. Molding is used above and below to decrease the length of the legs, all corners being miter joints to avoid showing end grain. The rails and a member under the stretcher are dovetailed into the end pieces giving the table absolute rigidity. The ends of the stretcher are mitered into the molding as shown. This table was not provided with a drawer tho the rail is wide enough for this if desired.


PORCH SWINGS.
A
B
20
23
24
22
25
26
21

The photograph shows a table made from this design by Chas. A. Meister of Ashtabula, O., while a student at Bradley Institute. The top in this case was

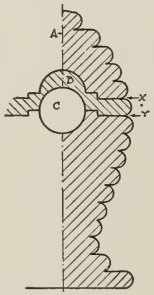
made of soft wood, covered with leather and fitted inside of a frame to protect the edge. The second photograph was taken as the table was being assembled in order to show construction details.


LIBRARY TABLE
30
50



TURNING PROJECTS

The left hand object in the above cut shows a pair of closed folding candlesticks, which appear opened below. This is an advanced turning project involving fitting, face-plate, chuck and spindle turning. A tap and die are necessary to cut the threads for assembling the different parts. The candle holders are not screwed down tight in order to show these threads.

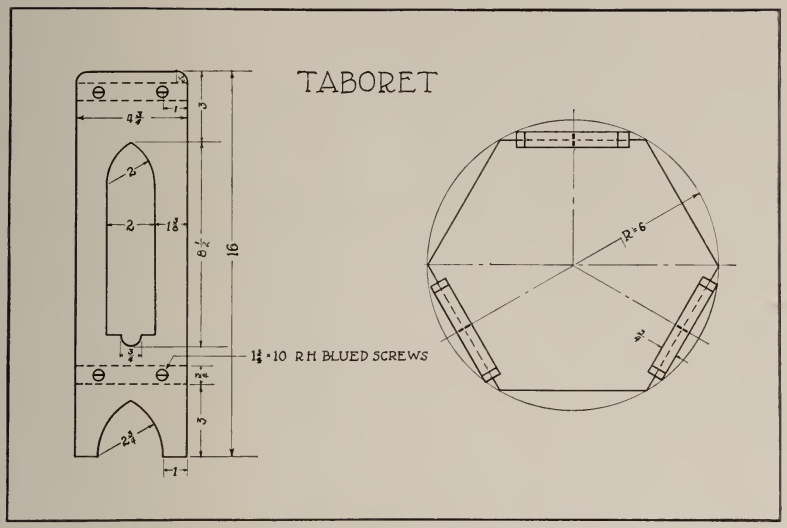


The second article involving both spindle and faceplate work is a handy article for the sewing-table as it provides space for spools of thread, pins in the trays above, and hooks on which to hang shears.

The third is simply a puzzle. It consists of the four parts shown below in the drawing. In operating this puzzle the covers A and B are first removed showing the small black ball C. The spectator is asked to remove this and lay it aside. The covers are put in place again and after a few passes the statement is made that the ball is again in the urn, after which the cover A is removed at the parting X instead of Y showing the ball B. This project involves gouge work and very careful fitting.

The fourth project shown above is a nut cracker of considerable historical interest. This piece was made about seventy years ago in one of the first manual training schools at Petrograd, Russia.

—H. L. Hurff, Bradley Institute.

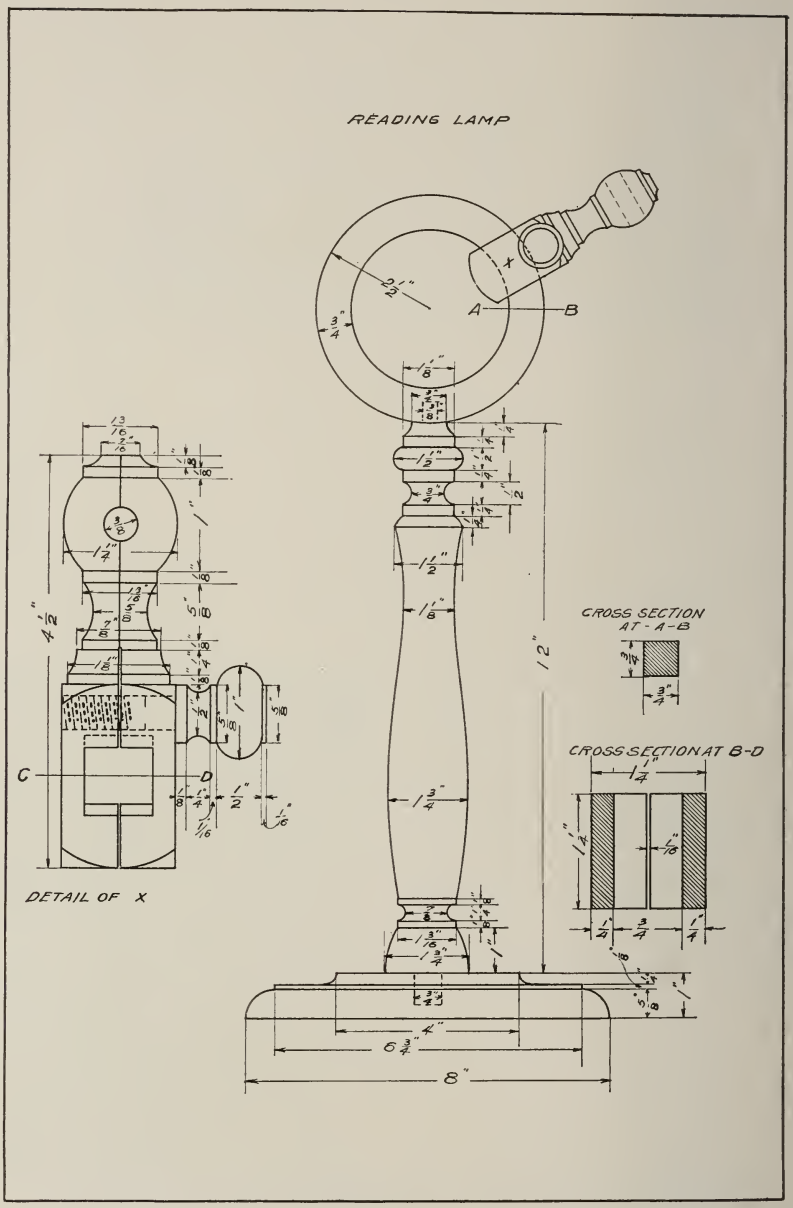


TABORET

The taboret shown in the photograph and drawing was designed by F. J. Gottwald of Duluth, Minn., and has been found a very successful project in his grammar grade classes. While the design is out of the ordinary the tool processes involved are quite within the ability of the boys of the elementary school.

READING LAMP

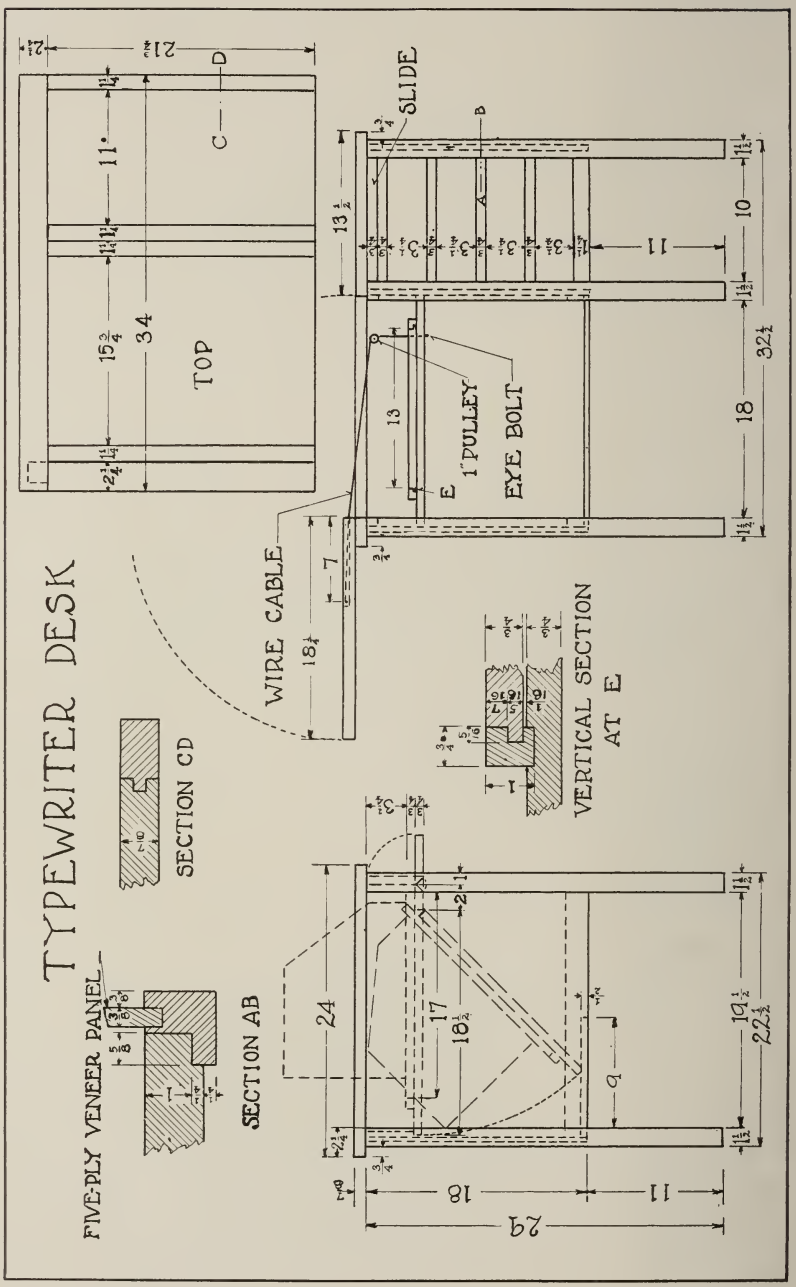
The reading lamp shown in the drawing and photograph was designed and made by a pupil in the manual training department of the Jackson, Minn., schools under the direction of M. A. Neudecker. A brass thumb-screw may be used in place of the wooden one which holds the adjustable arm. The arm is made in two parts glued together with paper between the parts of the joint.



After it is turned it is separated and the mortise cut to fit the ring, then glued again. The electric socket is fastened to the arm by means of an iron nipple. An aluminum shade should be used.

TYPEWRITER DESK

E. H. Petry of the Evanston, Ill., Township High School contributes the drawing and photograph of a typewriter desk that successfully meets the demand for a drop-head stand suitable for home or small office use. This desk has been a good problem for high school boys taking both typewriting and woodwork.


TYPEWRITER DESK
FIVE-PLY VENEER PANEL
SECTION AB
SECTION CD
TOP
WIRE CABLE
SLIDE
1" PULLEY
EYE BOLT
VERTICAL SECTION AT E
24
18
11
34
21
15¾
11
13½
18¼
7
13
10
32½
22½
19½
18½
17

REVIEWS

Vocations for the Trained Woman. By Eleanor Martin and Margaret A. Post, prepared under the direction of Dr. Susan M. Kingsbury of Simmons College. Published by Longmans, Green & Co., New York. 9¼x6 in., 165 pages.

The Public Schools and Women in Office Service. By the department of research, Women's Educational and Industrial Union, Boston, prepared under the direction of May Allinson. Published by the Women's Educational and Industrial Union, Boston. 9¼x6 in.; 79 pages.

These books are part of the series, "Studies in the Economic Relations of Women" which have grown out of the work of the Women's Educational and Industrial Union of Boston. The several chapters are written by different authors. Each chapter is, in fact, a report of an investigation made by the author in some special field. *Vocations for Trained Women* contains four such reports of intensive studies of the following vocations for women; agriculture, social service, secretarial service, and the business of real estate. These reports outline the nature of the work in question, the kind of training necessary for it, and the usual range of salaries. *The Public Schools and Women in Office Service,* gives the result of an investigation of the commercial conditions that effect commercial education, such as supply and demand for trained workers, distribution of the workers, selection and placement, and the changing conditions of commerce.

Structural Steel Drafting and Elementary Design. By Charles D. Conklin, Jr., Cooper Union Schools, New York City. John Wiley & Sons, New York, 1915. 9x12 in. oblong; 154 pages; price $2.50 net.

This is a comprehensive treatise giving not only facts and formulae but especially methods of making practical detail drawings of steel structures. The point of view of the author is that the average technical graduate lacks working knowledge of structural steel drafting; the college textbooks neglect the preparation of drawings which are necessary before the design can be realized. This book is intended to supply what is lacking in practical drafting knowledge and to do it in a form convenient for the engineer's office or the technical school drafting room.

Cement Houses and Private Garages. With constructive details by numerous architects. Building Age Series, No. 5; David Williams Company, New York. 9x13 in. oblong.

This book contains 22 designs of cement coated dwellings ranging in cost from $1,250 to $16,500, and eleven garages costing from $500 to $10,000 each. With each design is a brief description, often including extracts from the specifications.

RECEIVED

Vocational Schools for Illinois. Published by the Commercial Club of Chicago. A 66-page pamphlet presenting a discussion of legislation on vocational education from the standpoint of the Commercial Club and including a proposed bill.

The Public Schools of Springfield, Illinois. The educational section of the Springfield survey, conducted under the direction of Dr. Leonard P. Ayres. Published by the Russell Sage Foundation, New York City; price, 25 cents.

Mental and Physical Measurements of Working Children. By Helen Thompson Wooley and Charlotte Rust Fischer. Vol. XVIII, No. 1 of The Psychological Monographs. Published by the Psychological Review Company, Princeton, N. J.

Manual Training in Rural Schools. By L. M. Roehl, director of farm mechanics, Milwaukee County School of Agriculture and Domestic Economy, Wauwatosa, Wis. This bulletin aims to give the rural school teacher the assistance he needs in choosing equipment and selecting projects in teaching woodworking. It contains working drawings for eight projects.

Seattle Children in School and in Industry. By Dr. Anna Y. Reed. Published by the Board of School Directors Seattle, Washington, January, 1915. This pamphlet of over 100 pages contains recommendations for increasing the efficiency of the school system and for decreasing the social and economic waste incident to the employment of children 14 to 18 years of age.

Preliminary Suggestions for Agriculture, Domestic Science and Manual Training. For elementary grades and high schools. Issued by the State Department of Public Instruction, Des Moines, Ia., March, 1915. This pamphlet of 20 pages gives suggestions concerning means of compliance with the state law which requires the teaching of elementary agriculture, domestic science, and manual training in the public schools of the state of Iowa after July 1, 1915. Three more bulletins, one on each of the three subjects, will be issued soon.

Model Farm Houses. By Maurice I. Flagg, director of the Minnesota State Art Society, St. Paul. Extension Bulletin No. 52, published by the department of agriculture of the University of Minnesota. A valuable collection of house plans—the results of a prize contest in planning a model farm house.

Empire State Vocational Conference Bulletin, Vol. 1 No. 2. Report of a conference held in Utica, N. Y., Oct. 30-31, 1914. Printed by the boys of the printing department of the Elm Vocational School, Buffalo, N. Y. W. B. Kamprath, managing editor.

Lincoln Agricultural School. Lincolndale, N. Y. A booklet describing "the Lincolndale system of boy care," with a fitting introduction written by Arthur D. Dean. Well printed and beautifully illustrated.

VOLUME XVI NUMBER 10

MANUAL TRAINING
AND
VOCATIONAL EDUCATION

JUNE, 1915

THE NECESSITY FOR HIGH SCHOOL COMMERCIAL COURSES

JOHN W. CURTIS

EVERY subject which develops culture and practical power in the individual and contributes to the welfare of society in general is a necessary part of our high school curriculum. In order to measure the demand for a given subject of study or to compare its utiilty with other subjects, we may with reasonable safety base our conclusion upon a comparison of the relative number of students pursuing the subjects under consideration. Our most recent census reveals the fact that the number of students in commercial subjects is about equal to the number in professional subjects. From the same source of information, we learn that about seven times as many people are engaged in commercial pursuits as are earning their living in the so-called professions. These comparisons indicate that many of our young people enter commercial pursuits without adequate preparation for the service which they are expected to render. The result is disastrous both to the individual and to society as a whole. The local prosperity of our people is so dependent upon our domestic commerce, and the foreign commerce of this country is so essential to our national supremacy that we must qualify our young people for this important service in their local communities, in the nation, and in the countries beyond the seas.

Every teacher who has learned stenography, who has used it in practical commercial service, and who has taught it to grammar school pupils, knows that it possesses genuine educational value and that it contributes very materially to the improvement of every person who pursues it successfully.

Owing to its more intimate relation to other school subjects, I believe that bookkeeping is of still greater value educationally than stenography. It certainly stimulates penmanship as nothing else can. Bookkeeping places a commercial value upon neat, legible, rapid pen-

manship. This cash value of good penmanship has aroused many indifferent students and has aided in guiding them to lives of usefulness.

Commercial courses have enriched both history and geography. The history of commerce follows very closely the history of exploration and conquest. The history of our people in their commercial development is far more interesting and decidedly more helpful to the present generation than the stories of bloody wars, the sacking of cities, the plundering of homes, the violation of human rights, and the seizure of territory by the victors. It seems to me that the time is near when our school histories will present the story of our commercial and industrial development and will mention wars briefly as unfortunate and unnecessary impediments to the world's progress. If we substitute heroes of commerce for veterans of war and write stories of helpful inventions, of industrial development, and of commercial achievement, we shall greatly augment the world's prosperity and happiness. Commercial courses vitalize English and arithmetic. Writing simple useful business forms and business letters gives to the study of English a meaning which can never be gained from the teaching of technical grammar alone. The description of the qualities of fabrics, of the sizes and designs of desired machines, of the composition of soils for the production of certain fruits and vegetables, and of the characteristics of climate for the promotion of proposed industries vitalize English composition and make it a pleasure rather than a punishment to the average student. The solution of problems involving interest due, bank discount earned, or specific and ad valorem duties to be paid, gives arithmetic a new meaning. Instead of turning to the answer for guidance in solution, the student knows that his final answer is to be found in his balance sheet and he seeks a rational solution as a means to a significant end.

No one questions the value of commercial training for the young man or for the young woman who is to enter commercial service. I invite your attention to the fact that commercial training is necessary for the modern farmer and ranchman as well as for the merchant and manufacturer. Practical elementary training in bookkeeping alone will greatly reduce the unnecessary loss to many farmers and it will also stimulate economical management which will greatly increase the earning power of their investment of both time and money. The contribution of commercial education to the homemaker will be quite as great as it can be to the farmer. Our school authorities are now giving more attention then ever before to the preparation of our young women for skilful

home management. If the father and the son are to be efficient wage earners, the mother and the daughter must become the wise economical money users. They must know how to go into the world's markets and select durable, appropriate clothing and suitable nutritious foods without being cheated.

THE PUBLIC SCHOOLS SHOULD PROVIDE COMMERCIAL EDUCATION

Whether right or wrong, our people are committed to the policy of public education. Since this is true, our schools must provide all the educational opportunities which all the people require in order to qualify for all the service to be rendered; unless the qualifications may be secured elsewhere more satisfactorily than in the public schools. If capable instructors and sympathetic associates were available, I believe the comparatively few people who really enter commercial pursuits could secure their commercial training more satisfactorily in the business office than elsewhere. In other words, so far as environment is concerned, the business office is the best place to learn business, just as the mine is the best place to learn mining, and the forest the best place to learn lumbering, and the farm the best place to learn farming. However, such a plan must be abandoned when we remember that efficient instructors and unselfish associates are usually very rare and that comparatively few who should study commercial education will ever enter commercial service.

Commercial instruction is now being given in more than a thousand business colleges and private high schools and some of them are rendering efficient service to the young people and to the world; but others are both selfish and inefficient, and really have a kind of parasitic existence instead of contributing to the welfare of society. Since commercial education is both vocational and cultural, its general introduction into the public schools would be just and wise even if the private schools did efficient work. Since many of the private schools are failing to properly prepare their students for efficient service, it is urgently necessary that our public schools provide adequately for this important branch of study.

The latest census reports cause me to believe that about two thousand public high schools in this country give some commercial instruction; but it seems reasonably certain that less than twenty-five per cent of the students enrolled receive any commercial training. In too many

instances the failure of students to receive this instruction may be traced to the unfriendly attitude of prejudiced instructors and the fact that the commercial subjects are too often given only in the advanced grades.

PROPERLY GRADED INSTRUCTION SHOULD BE GIVEN EARLY IN THE COURSE

Until the junior high school wins the general approval of our school authorities, I believe we must try to provide some elementary commercial instruction in the upper grammar grades. At least, it must come in the first year of high school instruction. Private commercial schools have secured their students very largely from the grammar grades and from the graduates of the eighth grade. Last year at a convention in Chicago, I was informed that the private commercial schools of Chicago had an enrolment greater than the combined enrolment of all the public high schools of that great city. Several speakers asserted that seventh and eighth grade students were solicited by the agents of the private schools and that many boys and girls left the public schools rather than wait for commercial training in the high schools.

In the Memphis Vocational School, students who have finished the regular sixth grade work are permitted to elect both stenography and bookkeeping and their success in these subjects equals their success in the regular or academic subjects. Many of our eighth grade graduates are in the commercial service of the ctiy and they are rendering efficient service both as stenographers and as bookkeepers. Of course, there are some positions which require more thoro training in English, etc., than these students secure in the grades; but the same may be said of the students who complete the high school courses, and of some who have graduated from reputable colleges. The following facts may be of interest. Our eighth grade graduates who enter commercial service usually receive a higher entrance salary than the regular high school graduates who enter the school service; and the commercial service offers more rapid promotion than the school service. In other words, commercial education pays even if given only in the upper grammar grades.

In order that all the young people who enter our commercial deparments may be benefitted and that those who desire to enter commercial pursuits may be properly prepared for efficient service, we must have capable teachers. These teachers must have the necessary technical training, but that is only one of the essentials for success. They must be

liberally educated; they should possess actual experience in the commercial service for which they are preparing students; and they must have that ambitious enthusiastic personality, that genuine sympathetic interest in humanity, and that sound judgment which enables them to cause students to crave success and to be willing to pay the price which it exacts.

COMMERCIAL COURSES MORE PRACTICAL

It seems to me that we must also make a new approach to the subject. The budget systems with their make-believe transactions are undoubtedly helpful; but I think we need such a change as will provide something less complicated to precede them and something far more practical to follow them. If it is planned that students shall devote two years to a course in accounting, I believe that the first half-year should be given to writing receipts, notes, checks, money orders, drafts, bills, and other business forms, and to learning the customs and most elementary laws of commercial usage which will develop a broader commercial intelligence; the second and third half-years may be devoted to some budget system supplemented by much practical instruction by the efficient teacher whose thoro knowledge of local commercial practice enables him to familiarize his students with the best usage; and during the fourth half-year the students should have some scheme of office practice which is more real than the usual budget system provides. During the last half-year of the course, every student who intends to enter local commercial service should, if possible, be given one or more days each week in a business office. I am hopeful that many of our business men may be induced to contribute this opportunity to the cause of practical vocational education.

At this time when trade routes are being changed and international commercial relations are being influenced as never before, it is of vital importance that our people here in the South prepare to grasp the opportunities which are being presented. What may be termed the industrial awakening of the South is certain to demand efficient commercial employes in increased numbers; the opening of the Panama Canal will increase the volume of commerce passing thru the southern ports; and the European war will undoubtedly be the means of increasing our commerce with the South American republics.

Our schools should have emphasized commercial education years ago. If this had been done our young business men would appreciate more fully the wonderful opportunities which are now being presented;

and the young men and young women who are just leaving school would be prepared to enter clerical positions where promotion is sure instead of swelling the ranks of the idle rich or of the useless poor.

Society demands the services of physicians, attorneys, ministers, teachers, artists, musicians, architects, engineers, home-makers, mechanics, bookkeepers, and stenographers. The public high schools are maintained in order that all the children of all the people may be prepared for happy, successful, citizenship. Higher institutions of learning are necessary for the preparation of physicians, teachers, engineers, etc.; but our high schools can and should supply adequate commercial education. If this is done, our young people will be induced to know our resources, to appreciate their opportunities, and to achieve success for themselves, for their communities, and for our nation.

I WOULD LIKE TO IMPRESS THE IMPORTANCE OF AN EDUCATION IN COMMON THINGS FOR COMMON PEOPLE, AS OPPOSED TO THE EXCEPTIONAL AND THE REMOTE AND THE EXTRAORDINARY. A GREAT NATION IS NOT THE OUTGROWTH OF A FEW OF GENIUS, BUT THE SUPERLATIVE WORTH OF A GREAT COMMON PEOPLE. UNLESS THE MAIN OBJECT OF ALL EDUCATION FOR THE MASSES IS THE MAKING OF A GREAT COMMON PEOPLE, WE SHALL FAIL. IF OUR INSTITUTIONS ARE TO BE PRESERVED WE MUST MAKE GREATNESS COMMON.

—S. A. Knapp.

THE PHILIPPINE PUBLIC SCHOOLS AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION

CHARLES H. MAGEE

IT is no small distinction for the public schools of the Philippine Islands to be occupying more floor space at the great Panama-Pacific International Exposition than any other school exhibitor, and to be the only exhibitor which will show the operations of a complete school system. But such is the substance of a recent statement made by Mr. Alvin E. Pope, chief of the departments of Education and Social Economy. I wish to outline briefly some of the phases of the work which are to have emphasis in our display, and in but a general way, to indicate the manner in which the more than 9,500 square feet of floor space—one-fourteenth of the entire Palace of Education and Social Economy—will be occupied.

Aside from the exhibit itself, attention must be invited, first of all, to the manner in which it is to be housed—to the splendid booth construction which marks the Philippine educational exhibit, as it does the Philippine Pavilion and the exhibits which are being installed in other of the exposition palaces, as something of permanence and beauty, something distinctly and unmistakably Philippine.

The exhibit may be subdivided into elementary education, secondary education, higher education, special education in agriculture, special education in commerce and industry, the physical training of the child, the mediums employed for the study, betterment, and investigation of and the indirect training of the adult. On the social side will be shown social and economic conditions, and the manner in which the industrial program touches labor, cooperative institutions, municipal advancement, and the recreation of the people.

A great deal of the floor space is given to the industrial side of the Philippine school work. This is mentioned here in passing, because it is so closely correlated with the general Philippine scheme of exhibit and with that of the Panama-Pacific International Exposition as well; it is but fulfilling its appropriate part in the great industrial and commercial exposition. The Philippines are here to profit by publicity

which will bring to the attention of the world a great industrial and commercial possibility, a country which is just beginning to bestir itself along these lines and which must come in closer contact with the markets that are ready and more than able to absorb its entire output. Aside from the educational exhibit of the public schools held in the Palace of Education and Social Economy, there is also conducted a sales exhibit of industrial products of the public schools, in the Philippine Pavilion. In these two displays, there will be exhibited thruout the Expostion year something like 50,000 separate industrial articles from the public schools—all made by the pupils within the past year as a part of their prescribed daily work. The total money value of the public school exhibit including booth construction, the maintenance of the personnel and the exhibit proper, will approximate $100,000 by the close of the Exposition.

OUTLINE OF ENTIRE SCHOOL SYSTEM

It is our purpose to show as well as it can be done in an exposition the complete system as it is now organized in the Philippine Islands from grade one, the lowest work of the primary course, thru the various colleges of the University of the Philippines. The exhibit is to show first of all the idea of centralized school management—of absolute executive control over one school system. The balanced curriculum with its academic work, physical training, and industrial instruction will form the basis of this exhibit; and those public school activities indirectly connected with the curriculum will have a place—the centralized plan of organization, the campaigns for standard sites and school buildings, office management, publications, the public welfare movement with school social centers, school finances (the entire expense is paid by the Philippines and not one cent by the United States), literacy in the Philippine Islands, training in public health and citizenship, and campaigns in the production and preparation of corn and other foods which should be in more general use. Closely associated with the industrial program, the special training of girls will have representation, the preparation given them for the duties of the home and the improvement of standards of living. In the academic section will be found some 80 bound volumes which represent by classes the work of the pupils in every course, grade, and subject to the end of the secondary period. This is the actual and usual classroom work exactly as it is found in the

public schools of the Islands except as it has been arranged in uniform style for exposition purposes. There will also be a reference collection in bound form of all the publications of the Philippine Bureau of Education since its inauguration in 1901, as well as several interesting compilations of educational data for the student of school affairs. There will be on display a complete set of the text-books now prescribed for use in all grades of the Philippine public schools, and in contrast with them a few of the texts in use during the Spanish administration, as well as a dozen or so of the earlier texts used in the American schools of the Islands before the new and complete set of books especially prepared for and now used in the schools could be arranged for. Our plans include a small model primary class of Filipino pupils taught by a Filipino teacher with the equipment actually in use in the Philippines and under schoolroom conditions as nearly as possible the same as those found there. In this model class, the full primary course of study for grades I, II, III and IV will be followed out for boys and girls.

But the main portion of the pedagogic display will consist of several groups of wall charts which will present in concise form the most striking phases of Philippine school work; the centralized system of organization and administration, the courses of study, the industrial program, school athletics, the campaign for sites and buildings, gardening and agriculture, public welfare work, the distribution of schools, and some of the most important facts and figures on the conditions which obtain and the results secured. It should be kept in mind that all instruction in the public schools is given in the English language— a language foreign to the Philippines but now the official language—and no instruction is conducted in the Spanish language nor in any of the numerous dialects which are spoken by the people.

In connection with the building charts there will be found a miniature of one of the standard reinforced concrete buildings, which are being constructed now in all parts of the archipelago—some four hundred of them already occupied. They are made in several sizes. This model is of two rooms and shows the unit system of construction explained in the charts, and the style of architecture which has been worked out for the tropics and for the Philippines, and which admirably meets the requirements, pedagogically, hygienically, and structurally.

In the technical side of the industrial exhibit will be found some of the fundamentals of the industrial processes upon which the entire vocational program is founded. In the forms of photographs, herbarium sheets, raw materials, prepared materials, and articles in unfinished and

completed states will be shown the products of the forest, field, and swamp—fibers, grasses, sedges, rattans, bamboos, and trees. Many of these industrial materials have long been known in the established industries; but not a few of them have been discovered and worked out in the experiments of the schools under well ordered and systematic economic and industrial surveys of the Islands. The dye work is purely the result of school enterprise, and has been studied out in great detail for many of the industrial materials.

Thruout the exhibit, and particularly in these sections, will be found the industrial models which show by steps the many processes in the making of the principal articles of the display, from the raw material to the finished article. These processes have not been determined thru following local or foreign practice; they can be and have been worked out by much painstaking experimental work. It is expected and required that improvements follow in every line.

EXHIBIT OF INDUSTRIAL MATERIALS AND PROCESSES

We now come to the industrial exhibit of the public schools—the six booths in which are on display the articles of the many industrial branches which receive attention. These embrace special booths covering the household industries, and one large section given over to the furniture and pottery displays from the several trade schools of the Islands. Of the former, there will be special booths for abaca (Manila hemp), bamboo, ferns, palms, and needlework. The abaca, fern, bamboo, and palm booths take their names from the material which forms the basis of the industrial product displayed in each of them, and which forms the motif of its interior decoration. The purpose in each instance is to show how these several groups of plant materials may be worked up into a great wealth of commercial articles, to show how important each of them may become to the community, and also how the by-product of the manufacture of one article may be used in the preparation of something entirely different—an economic principle which is today of the geratest importance in the commercial world. The needlework booth will cover the embroidery, lace, and sewing work. Philippine embroidery is a long established industry and has made a good name for itself. Tho restricted to certain districts in past years, it is now taught in every town. Lace making and plain sewing have been introduced generally by the public schools. There will be a profusion of beautiful pieces of needlework, many of them done in the exquisite native materials of the Islands.

Tho of small area (total area 800,000 square miles and land area of 115,000 square miles), smaller in size than the State of California (155,980 square miles), the Philippines rank sixth among the nations of the world in wealth in forest lands, and nowhere are there to be found more beautiful and durable and generally valuable woods for interior finish and cabinet purposes. The woodworking departments of the eighteen provincial trade schools and the seventeen provincial school shops of the Islands were the first schools in which any real advance along school industrial lines were made; for several years they have been training young men in the making of furniture, in building construction; and in other trade branches.

One of the displays which should be of most immediate interest to Exposition visitors is the school working exhibit, where half a dozen student artisans are engaged in preparing the material and making some twenty-five of the more important articles. These embrace embroidery and lace; basketry; mat, cushion, slipper and hat making; hand and loom weaving; and the turning of small articles in Philippine woods.

In this Philippine educational exhibit the visitor will not fail to be impressed with the amount of emphasis which is being placed upon the indutsrial features. This impression will be further emphasized by the sales display of school made objects, which will be conducted in the Philippine Pavilion. The reasons for this emphasis on industrial instruction are many: the insistent and widespread demand for such training thruout the United States; the opportunities for demonstrating the industrial and commercial activities of the Philippines thru such a school display; the desire to answer completely the numerous inquiries which we have received for information upon the industrial phases of our work; and the desire to show the American public something of the capacity of Filipino school children. In the entire scheme of public education, however, the industrial side is relegated to the proper place and is but one of the important aims. The great general purpose is something much broader than this—the development of school children into useful citizens in the fullest meaning of the term, in the home life, in industry, and in society. Nor is the ultimate industrial aim merely to teach the making and selling of an object; aside from the pedagogic principle involved in teaching children to make something useful with their hands, there is the big problem of introducing directly into the homes profitable industries which are taught in the schools.

VOCATIONAL EDUCATION IN BRAZIL

HAROLD E. EVERLEY

THE great wave of enthusiasm for vocational education which has been passing over the United States has reached Brazil, and it seems to have accumulated force as it came. The people here are beginning to feel the need of training the young who are to enter

GENERAL VIEW OF THE VOCATIONAL SCHOOL

the industrial fields, and the government is establishing trade schools in various cities. Brazil is greatly dependent upon men from other countries to manage its industries, and is trying to eliminate this condition by giving her own people the necessary training.

Recently a vocational school for boys was opened in Rio de Janeiro. Such trades as wood and metal working, printing, bookbinding and photography are taught. Altho in the past there have been schools of a vocational nature for men and women, this is the first of the kind in Rio de Janeiro to be part of the public school system.

Probably the best vocational school of Brazil is one of the departments of a large engineering institution, the Escola de Engenharia of

Porto Alegre. It is located in an industrial and educational center, and both state and federal governments help support it. The purpose of including a free vocational department in an engineering school is to give educational opportunities to poor boys who are unable to attend any but a free school.

CIVIL ENGINEERING CLASS IN BEGINNING WOODWORK, 1915

The vocational department is called the Instituto Technico Profissional, and as its name implies, it provides professional training. This school is unique in many respects. Its course of study and pay system are unusual, and the opportunities it gives students are extraordinary. It has three distinct sections—Elementary School, Vocational School and Commercial Shops. Each is closely related to the other, and has for its aims the instilling of respect for labor (which is greatly lacking in Brazil), the training of more efficient producers, and the advancement of the different trades.

THE ELEMENTARY SCHOOL

A large per cent of the people in Porto Alegre, as in most Brazilian cities, do not have, or at least, do not take the advantage of public

school education, and for this reason it is necessary to begin the vocational courses in an elementary school. Because so many children are without any training whatever, the only entrance requirements are that the applicant be of good health, not less than twelve years of age and can prove he is unable to attend any but a free school. Last year more than five hundred students enrolled, and others applied for entrance but could not be accommodated. This is sufficient proof of the demand for such a school.

The aim is two-fold, namely: to give the boys (there are no girls in this school) such an elementary education as will assist them most in later life, and, if possible, lead them to discover what they are best fitted for in a vocational way.

The time required of a pupil in the Elementary School is seven hours a day, five and one-half days a week, thirty-six weeks a year for four years.

The course of study includes manual arts subjects and the usual elementary studies, such as are found in most lower grades of schools in the United States. The manual arts course is a result of a study of articles, outlines and suggestions found in the best books and magazines.

COURSE OF STUDY

FIRST YEAR

Reading	Gymnastics and Hygiene
Spelling	Music (vocal)
Arithmetic (4 operations)	Gardening
Freehand Drawing	Manual Arts.

SECOND YEAR

Reading	Geography of the State
Spelling	Gymnastics and Hygiene
Arithmetic (Metric System)	Nature Study
Freehand Drawing	Gardening
Music (sight reading)	Manual Arts.

THIRD YEAR

Portuguese Grammar	Freehand Drawing
Geography of the State	Gymnastics and Hygiene
Arithmetic	Nature Study
Practical Geometry	Gardening
Music	Manual Arts.

FOURTH YEAR

Portuguese Grammar	Elementary Sciences
Geography (general)	Freehand Drawing
Arithmetic	Gymnastics and Hygiene
History of Brazil	Band Music
Practical Geometry	Manual Arts.

OUTLINE OF MANUAL ARTS WORK

The time given to manual arts including drawing is one hundred twenty minutes per day, five days a week. The outline of work is as follows:

First Year:—Paper folding, cutting and weaving is the first manual training work done in the lower grades. Simple cardboard construction, bookbinding and freehand drawing are also introduced the first year. The work is taught by the regular teacher in the class-room. Those in charge should be given much credit for the way this is done, as none of them, excepting the superintendent from whom the teachers receive instructions, has had any special training for this work.

Second Year:—Clay, basketry and willow work are taken up the second year. The clay work is taught in the classroom by the regular teacher, but, as basketry and willow work is an important industry here, an expert has been employed to teach it. Under his supervision useful pieces are turned out in large quantities. The problems selected are those in greatest demand, and the school disposes of them at a slight gain. When the instructor is not teaching, he uses his time filling orders which the school receives from outside. Not only is the school able to pay much of the expense, but the pupils have an opportunity to see commercial work being done and to get some idea of what is expected of one of this trade.

Third Year:—Light metal work is taught the first half of the third year. It consists of making such articles as paper files, cup hooks, screw-eyes and wire puzzles. Trays, candle holders, blotter pads and other problems in sheet copper are made. A drawing of each probelm is required before the article is begun, and the necessity for accurate measurements is emphasized from the first.

The second half of the third year the boys begin benchwork in wood. For this there is a special shop and equipment. It is taught by the regular teacher who at one time was a professional woodworker. He is a practical man and allows considerable liberty in the selecting of models which involve required operations. The pupils receive instruction in elementary benchwork, turning and some technology. Fifteen is the average number in a class.

Fourth Year:—When the first three and a half years of the elementary course are completed the boys are sent to the various commercial shops of the Vocational School where they spend the last half-year. Each has the privilege of selecting any one of the many shops. While in the commercial shops, the pupils are furnished with benches and tools and work out a graded course of simple problems based on tool processes. This was planned by the head of the

department, and is taught by the foreman of the shop. Care is taken to select models which are of interest to the boys and of use after they are finished. The idea of giving the pupils of the elementary school an opportunity to work in the commercial shops under a foreman is unique and has been very successful

ADVANCED BASKETRY, SECOND YEAR OF THE ELEMENTARY COURSE—AGES 13 AND 14 YEARS

in the woodworking shop. This plan was adopted about three years ago on the entrance of the present head of the department. The object of sending the boys into the several shops is to have them experience real shop life and see manufacturing on a large scale.

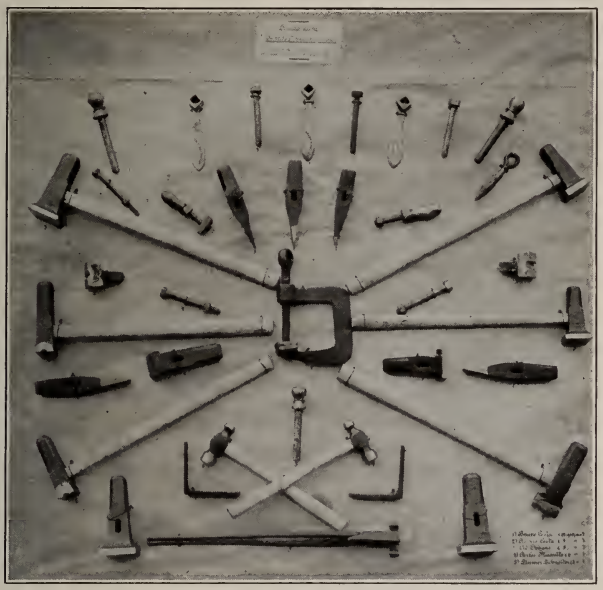
After the pupils have completed a four-year course in the elementary school and have spent a half-year in the commercial shops they are given an examination. If this is successfully passed they are permitted to choose a profession and take up advanced work in the Vocational School.

If pupils wish to keep any of their work they may do so by paying for the material, and may take it home after the exhibition which is held each year at the close of school.

THE VOCATIONAL SCHOOL

The Vocational School has two departments. One is the commercial shops where work or outside trade is done by hired workmen, and the other, which consists of shops, drawing rooms and recitation places, is for the instructions of students.

The commercial department is composed of shops for carpentry, cabinet-making, wood-carving, ornamental iron work, foundry, machine, forging, sculpture, printing, bookbinding, photography, galvanography and lithography. These shops have two purposes: to pay some of the running expenses, as they manufacture for the school and outside trade, and to serve as demonstration places for the vocational classes.

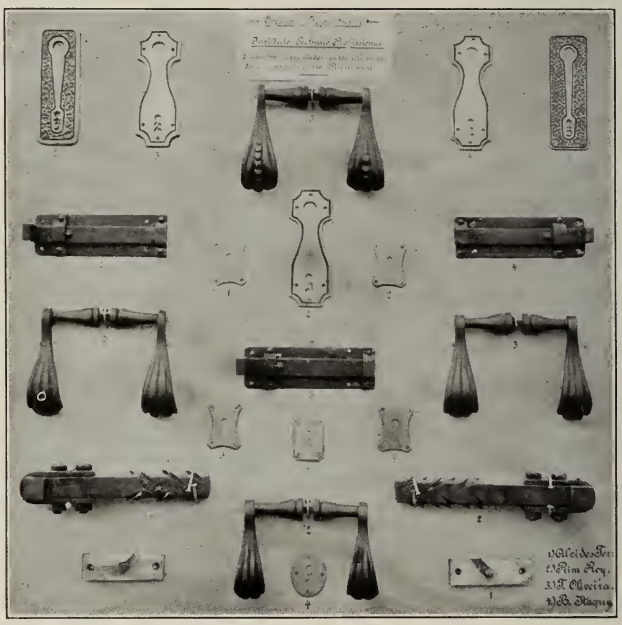


ELEMENTARY FORGE WORK, VOCATIONAL SCHOOL

Formerly the students worked with the employes as apprentices. This method was discontinued because of the growth of the commercial work and the increased number of students. In most cases the practical instruction is given in the shop with the workmen. This has been changed in the woodworking department in the last three years. In this section workmen and students have been entirely separated, and the students provided with their own shop. It has been found they progress much more rapidly when not disturbed by other work near them. The commercial part of this department is much frequented by the students, who are encouraged to enter for studying methods, and they are at liberty to enquire of the foreman or workmen as to details or processes.

The men are expected to give any help or information for which the students ask.

All the teachers of the Elementary School are natives of Brazil, but, on the contrary, the instructors in the Vocational School, who are also heads of their respective departments, are foreigners who have contracted for periods of three to five years. These men are from Germany, Italy,



ELEMENTARY ORNAMENTAL IRON WORK, VOCATIONAL SCHOOL

Belgium and the United States. They have full charge of their departments, including commercial work and instruction in the Vocational School. They are required to learn the native language, to be able to speak it fluently and present the work successfully.

The equipment of this entire school is high grade in every respect. The best German, French and United States tools and machinery have been installed. The machine shop may serve as an example of the different departments. Most of the machines are American make—Brown & Sharpe and others of high grade. These were installed at a cost of more than $30,000.

TECHNICAL COURSE

FIRST YEAR

Portuguese		Algebra
Arithmetic		Chemistry
French, German, English, Italian	any two	Experimental Physics
		General Technology of Shop
		Elective Subject
		Shopwork
Elementary Mechanical Drawing		

SECOND YEAR

Portuguese	Experimental Physics
Arithmetic	Languages (continuation of first year)
Algebra	Technology
Chemistry	Shopwork
	Mechanical Drawing

THIRD YEAR

Portuguese	Elementary Trigonometry
Geometry	Elementary Mechanics
Chemistry	Mechanical Drawing
Languages (continued)	Technology and Shop.

FOURTH YEAR

Portuguese	Perspective
Chemistry	Drawing Shadows
Language	Mechanical
Elementary Mechanics	Technology and Shop.

FIFTH YEAR

Practical work in the Commercial Shops.

SIXTH AND SEVENTH YEARS

Specializing abroad.

The entire morning of four hours is given to shop-work. This course extends over a period of seven and one-half hours a day, five and one-half days a week, thirty-six weeks a year for five years, and after this the most capable are granted two years' training in some foreign country at the expense of the Brazilian government.

THE WOODWORKING DEPARTMENT

As space forbids giving a description of each department, the writer will limit this article to the section of woodworking, of which he has charge.

Because of the great lumber interests of Brazil, woodworking is one of the chief industries, and this division is the largest in the school. Like the other departments it consists of two sections, one for commercial

work and one for the instruction of students, each of which is under the direct supervision of the head of the department.

The commercial section consists of three shops for carpentry, cabinet-making and woodworking machinery, a special finishing room and an office for designing and drawing. An assistant in the office helps in making estimates and doing clerical work. In the shops skilled workmen

FOUNDRY WORK, SECOND YEAR, VOCATIONAL SCHOOL

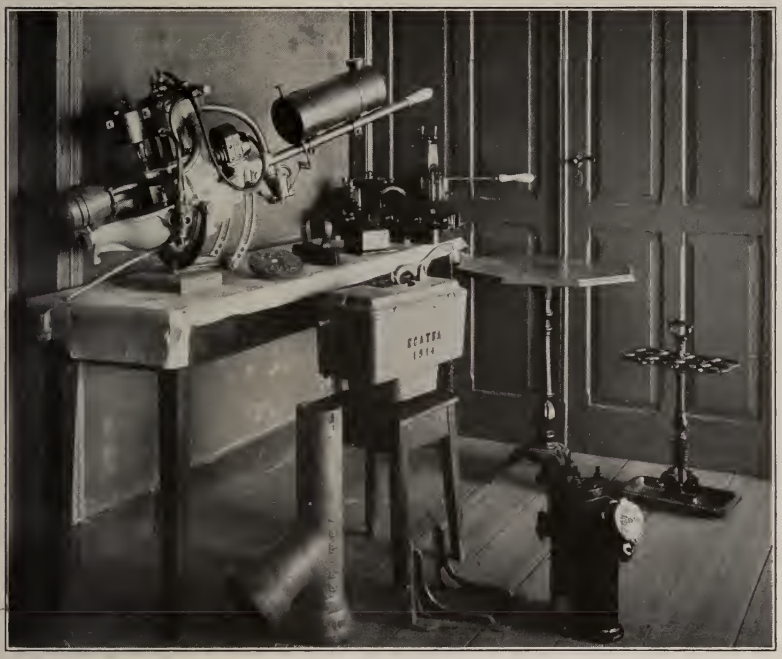
are employed under the supervision of a foreman, who is responsible for all work in his charge. The speciality of the shops is school furniture, school desks, drawing tables, supply cases, roller-top desks and chairs. However, during the past year, house furniture to the value of $5,000 was made.

The section for vocational instruction consists of a large shop, well equipped for benchwork and wood-turning, a drawing room and a recitation place. This division is under the direct supervision of the head of the department, who has charge of all practical and theoretical work of the students.

First Year:—In the first year the aim is to give a thoro grounding in the principles of benchwork, wood-turning, technology and mechanical drawing. Students are required to do all benchwork by hand, thus learning to do things

without the use of machinery, when necessary. The projects are carefully selected with reference to the value of the fundamental principles involved, their interest to the boys and the commercial value. All work not taken by the pupils is sold thru the salesrooms of the commercial department.

The technology for the first year is related to the general woodwork done at the same time. It is a study of the forestry of Brazil, classification of trees and woods, methods of lumbering and conserving lumber, dimensions and ways of measuring lumber, values of different qualities of woods and kind of work



FOUNDRY AND MACHINE SHOP WORK, FOURTH YEAR, VOCATIONAL SCHOOL

for which each is best suited, a study and classification of general woodworking tools and materials, such as nails, screws, stains, varnishes and paints.

The mechanical drawing is a study of the fundamental principles of orthographic projections in three views. Simple problems divided into three classes; straight lines, curves, and tangents to curves are gradually developed into more difficult drawings. No work beyond general shop drawings is done in class. Geometrical and perspective drawing, which are required subjects, are taught in special classes.

Second Year:—The first half of the second year is given to wood-turning and the last half to carving. The work in wood-turning consists of a general study of the subject. Technology and drawing are correlated with the work this year.

COURSE OF STUDY FOR WOODWORKING SHOP

YEAR	SHOPWORK	TECHNOLOGY	DRAWING
I.	Elementary benchwork based on tool processes	Forestry of Brazil. Classification of trees and woods. Conservation of woods. Methods of preparing for commerce. Values. Study of tools, stains, varnishes. Methods of using.	Freehand drawing. Sketching from objects. Elementary mechanical drawing. Lettering.
II	Wood-carving Wood-turning	Woods for carving. Carving tools and their uses. Finishing, staining, polishing. Lathe, tools and various cuts. Tool manipulation. Classification of commercial work.	Advanced mechanical drawing. Drawings of furniture and projects in carpentry. Designs for carving and woodturnings. Shop drawings and details.
III.	General carpentry	Construction of windows, doors, roofs, floors, stairs and small wooden buildings and a classification of types used in Brazil. Study of machinery used. Estimates of materials and prices.	Designs for doors, windows, stairs and roofs to scale. Details of same.
IV.	Cabinet-making	General principles of cabinet work. Classification of types of construction. Machinery used. Estimate of prices. Finishings. Designs and history of furniture construction.	Designs for furniture. Drawings and details of pieces to be made in the commercial shop.

V. For Specializing. The student spends his entire time in the commercial shop, working under a foreman.

Wood-carving is taught by an expert. In many cases the students do decorative work for the high-priced furniture made in the commercial department.

Third Year:—In the general carpentry the aim is to give the students sufficient instruction and practical work to make them familiar with the various types of construction and gain considerable skill. Such pieces as doors, floors and simple stairs are made. The doors and windows are built in regulation size and are used by the school or sold. Because of the climate there are very few

ADVANCED CABINET-WORK, FOURTH YEAR, VOCATIONAL SCHOOL

wooden buildings, and the carpenter's trade is limited to the work mentioned above.

In preparing stock for their work the students are required to manipulate the difficult woodworking machines. Preliminary instruction on simple pieces is given before the special problem is begun. The foreman of the machine room has charge of this and directs the getting out of material. The same method is used for the class in cabinet-making.

The technology includes technical instruction in carpentry, some study of strength of materials, and special metalwork used in window, door and roof construction.

The drawing consists of different views and cuts of problems given in the shop. When necessary, full sized drawings known as "rods" are used, but as a rule they are made to scale.

Fourth Year:—Cabinet-making is one of the most important lines of the woodworking profession in this country. The aim in this course is to give thoro instruction in the principles of cabinet-making and plenty of practical work.

The commercial shops for cabinet and furniture work are freely used for demonstration. It is of great value to the students to be able to observe different types under construction, and the shop methods employed. Last year the class in cabinetmaking designed and built many pieces of furniture, among which was a dining room set, which was sold for about $200.

The technology for this year is a study of the principles of construction, and a classification of furniture, stains, varnishes and other materials used in this work.

In the study of shop equipment each student is given the opportunity to work out the problems of equipping and the care of a shop.

Fifth Year:—When the students have reached the fifth year they are ready to select a particular line of woodworking and specialize. They pass into the regular commercial shop and work with the men. This does not mean that they become employes. They are still under the special supervision of the instructor, but they are given commercial work and required to observe shop rules and methods. At the close of the year of specialization they are capable of doing almost anything along their line, and they know the commercial methods employed. In every case the students are required to make estimates of their work that they may become familiar with cost and selling prices and know how to calculate them. When the piece is finished the estimated and actual costs are compared.

ADVANCED STUDENTS ABROAD

As was stated in a preceding paragraph, students of this school have an opportunity to continue their work in some foreign country for two years at the expense of the Brazilian government. One student from each department is selected each year. They are chosen according to class standing and ability shown in shop-work. Several boys were elected and ready to go to Europe and the United States in the fall of 1914, but because of the war some did not leave Brazil and those who had gone returned. During the years 1912-1914, two students were studying in the United States at Rochester Mechanics Institute, Baldwin Locomotive Works and General Electric Co., and one in Germany, working in wood. The two who were in the United States have returned and are now instructors in this school, and the one in Germany will take charge of the woodworking department when he arrives. The school assists all its graduates to secure good positions. So far this has not been a difficult task. As the school has been in operation but a short time, there are not many graduates, and trained men are in demand.

STUDENT PAY SYSTEM

The Vocational School has a pay system quite different from most schools of this nature. Beginning in the first year the pupils are paid at the rate of four cents an hour as soon as they are able to produce

articles of commercial value. The wages per hour are increased in proportion to the quality of work. No money is paid during the school term. It is reserved until the end of the course. Each student has an account book in which his earnings are recorded monthly. This money is put at interest, and when the boy completes the course, he is paid both principal and interest. This money may be used in any way the student wishes, but the school suggests that he buy a complete set of tools for his special work.

The boys are encouraged to work in the shops during vacations. At these times they are paid wages each month. The object is to encourage them to continue a thing they have begun, to improve their time and to keep alive an interest in the work.

Because of the present financial crisis, the work of establishing new schools in Brazil is almost standing still, but the government is preparing to establish vocational schools in different parts of the country when conditions are better. Because this school for boys in Porto Alegre is so popular, the government has promised a similar one for girls.

One important fact to be remembered is that these boys who are made self-suporting by being taught some useful trade, and some of them sent abroad to study are poor and not able to attend any other school. In a short time the Instituto Technico Profissional with its more than five hundred boys will have done much for Brazil.

DESIGNED AND MADE BY STEN A. STROBECK, SLOYD TRAINING SCHOOL, BOSTON

INLAYING—HOW AND WHERE TO USE IT

Ada Brownell Finley

INLAYING is to furniture what duchess lace is to dress. Duchess lace is a beautiful filmy lace that costs the substantial price of five dollars or more a yard. Its excuse for being is that it adds beauty. Even the uninitiated would not like it on a kitchen dress, nor would he like it any better on an evening gown of costly material, if the gown were ill fitting. So it is with inlays on furniture; at the very outset one easily decides that inlaying does not appropriately belong on the sturdy pieces of furniture made for hard service, nor on furniture that is poorly made, no matter for what designed nor of what expensive wood it is constructed. A piece of furniture, however, may be well made, but the worker lack the skill to give it a good finish. Surely it is obvious that of all things inlaying would emphasize this lack, not only by calling attention to the surface, but by suggesting the satiney finish of those wonderful masterpieces of "period furniture" associated in our minds with inlaying. We may then dismiss from our minds furniture made for rough use, and furniture that is not well made, nor well finished.

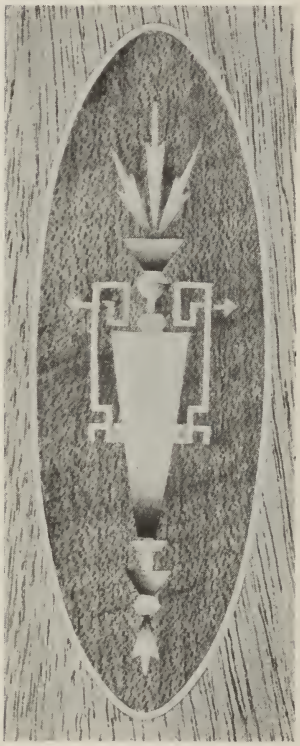


FIG. 1

Between these extreme cases and the furniture to which inlaying means the addition of the last possible refinement, there are hundreds of cases that require fine discrimination in deciding whether or not inlaying will be an improvement. It is safe to say, that inlaying of the right kind, and rightly placed, will mean added beauty in exactly the same ratio that the piece of furniture

itself approaches perfection—perfection in proportion and perfection in workmanship. Inlaying can become an incentive that will push the worker to go over and over his design to perfect it, even to the last detail, and an incentive to hold him to the painstaking craftsmanship that will make his ideal a reality.

Often the worker has not sufficient skill to make the inlay, and more frequently there is not time for such intricate work, but he can do as is

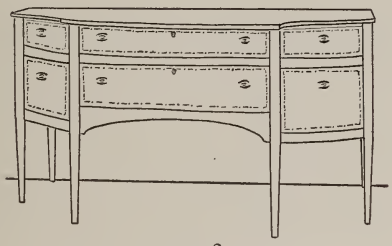


FIG. 2

done in many of the furniture factories,—buy the inlay, or marquetry, from some marquetry firm.[1] This article is written with the hope that it may help in the selection of inlays, tho the same suggestions would be made to one designing and making the inlays himself.

As it would be unfortunate to spoil a good piece of furniture with inappropriate marquetry, "What kind of marquetry is appropriate?" becomes the first question for us to answer. First, the marquetry must be appropriate in style. Instinctively one would not choose an elaborate inlay for a simple piece of furniture. Certain inlays, such as pictures in wood, or a single unit like Fig. 1, are designed for a vertical position to be seen always from one point of view. When such is placed on a horizontal surface like a table top it is seen from all angles, loosing its meaning, moreover, its proportions are distorted thru foreshortening. Another reason why the pictorial is unsatisfactory in such a place is

[1] The inlays photographed for this article were loaned by J. Bernard Co., 422-430 East Fifty-third Street, New York City. The borders range in price from 3 to 10 cents a yard, and the single units from 6 cents to $5.50. The price on the latter can be reduced by ordering several of one design as they are made in sets of twenty-five. Some of the inlays are left in the natural colors, others are stained in whole or in part.

that the use of the table top demands flatness. A round apple or a fragile rose is not just the thing one would choose on which to rest a pile of books, nor a tray of dishes. Roses and apples, however, are not at all disconserting on a table top when used as a motif for decoration, and are given a flat treatment.

The appropriateness of size must be considered. When selecting inlay in a line design one can hardly err on the side of choosing one that is too narrow. See, as in Fig. 2, how effective a border becomes

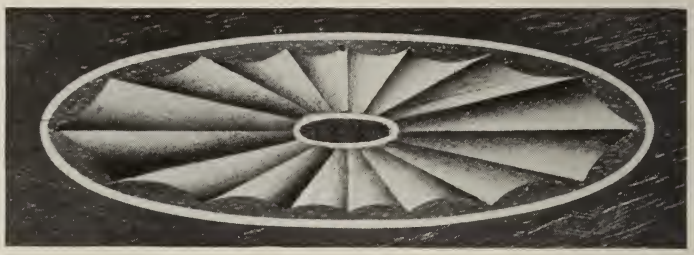


FIG. 3

thru repetition, even when the line of marquetry is small and put on a large sideboard, if it outlines several drawers and panels. The inlaying should be large enough to decorate, but not large enough to dominate. In choosing a single unit of marquetry, such as Figs. 3, 4, or 5, one will find that any such unit clamors for an undue amount of attention, and that to counteract this effect it should be surrounded by much free space—"a peaceful space" as it has been called.

Another point for our consideration is appropriateness of the colors in the inlay. Many of the borders in Figs. 6, 7, 8, 9, and 10 are beautifully colored. In the top border of Fig. 6 the center is light gray-green and mahogany, and the bands cream colored; and in the bottom one of Fig. 6 the center is pale shell pink with black and white bands. In the top one of Fig. 9 the center is "robin's egg blue" and cream, and the bands mahogany. Of course a border of contrasting color will stand out more prominently than one of a color much like the wood in which it is set. To overcome this over emphasis one can choose a narrower border, or if he has already decided to use as wide a border as is within good taste, then he should choose one that is not of a contrasting color. In Fig. 9, the first and fifth (from the top) have very wisely been made small because they are vivid in color. Tho

small, they are not weak. Closely related to the question of color is that of "value," or the degree of light and dark of color. The greater the contrast in value, either between the parts of the inlay itself, or between it and the color of the wood around it, the more strident the inlay becomes. This also can be controlled by reducing the size of the inlay. In Fig. 10 the second and third (from the top), because made of colors strongly contrasting in value, black and white, tho very narrow, are effective enough for quite a large piece of furniture. From theory and imagination one can eliminate the extreme cases in the consideration of size, color, and value. This narrows one's choice to four or five possible pieces of inlay. The surest way to determine the best of these is by actual trial. If one has not the inlays he can make paper duplicates. Tho made somewhat crudely they will be of great help.

FIG. 4

Besides style, size, color, and value, we must consider the design and shape of the inlay. A well designed unit of marquetry, especially other than the geometric, is more difficult to find than a well designed border. See Figs. 3, 4, and 5. Since the chances of making a poor choice are more numerous in the case of the single units than in that of the borders, one ought to hesitate to select them for the first few pieces of furniture he inlays. Figs. 6, 7, 8, 9 and 10 show several borders that are unusually good in design. In them are pleasing units, for repetition, and these are so spaced that they do not stand apart, appearing unrelated, but hold together as one design. The bands which are well proportioned to each other and to the border itself add to this effect of unity. It is the unity and proportions of these borders, even more than their beautiful colors that make their charm.

FIG. 5

Let us suppose that after the careful consideration of the above points we have selected an appropriate border for the top of a square sewing-table. We are now confronted with the question of where to

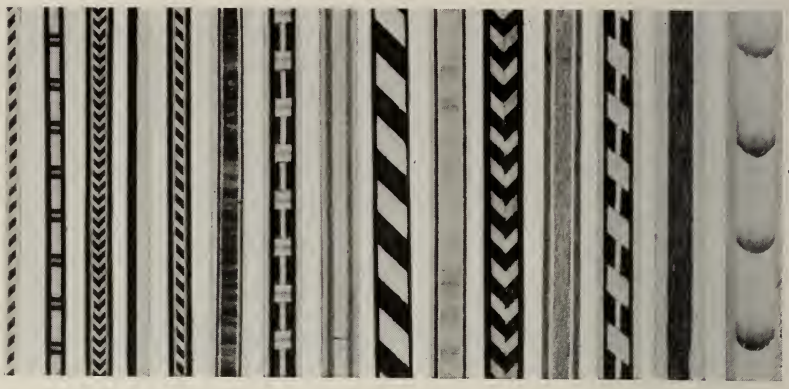


FIG. 6

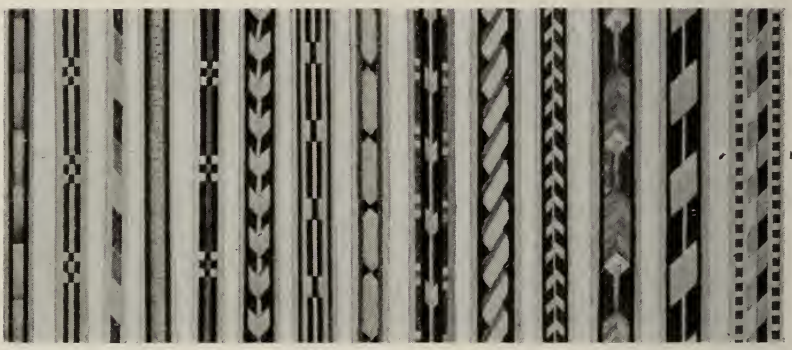


FIG. 7

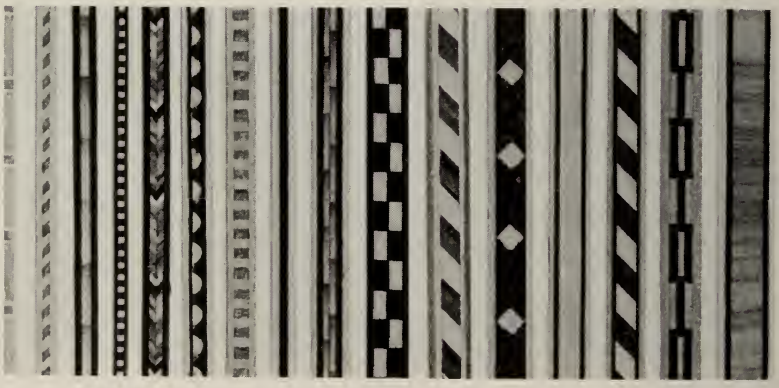


FIG. 8

place it. As far as good design is concerned we could place it near the center, but it is rather foolish to decorate just the place that will be covered when the table is in use. So we will put it near the edge. The table top, an unbroken space, will be cut up into several spaces by the inlay, and we must consider the proportions of these spaces to each other and to the size of the inlay. If one leaves a space between the inlay and edge of the table about the width of the border, the effect will be more monotonous than if there is a difference between the two. The border is too near the edge when it looks as tho it would slip off, and it is too far away, when one does not feel that the inlay belongs definitely to the edge of the table (in this instance) and not to the center. This is accomplished by making the space within the border decidedly larger than that without. If one space is not considerably larger than the other, the eye vascillates between them, which is neither restful nor pleasant. If the worker feels that he can add to the interest of his decoration by deviating a little from the edge of the table, say at the corners, this can be done successfully if done cautiously. The amount of deviation is right so long as it does add interest, and it is too much as soon as it cries out for attention, as it would cry out if placed, for instance, so as to cut off large "kitty corners." It has been said that one can do almost anything in designing if he does it with restraint.

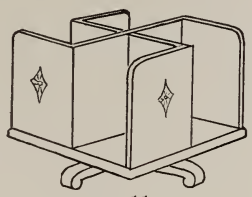


FIG. 11

Suppose we have chosen a single unit to be placed on the sides of a book-rack, as in Fig. 11. Single units break up the monotony of plain surfaces. If the unit is put exactly in the center of the space it looks as tho it had fallen out of place and ought to be pushed up. If it is put just enough above the center to overcome this effect, the spaces above and below it appear the same width, which is monotonous. When it is put a little higher still, making just an appreciable difference between the bottom and top margins, interest is added by this subtle difference in the two margins. It is put too high when it again causes in the beholder a strong desire to push it down. There is a right place. It can best be found by temporarily placing the inlay in different positions. There must be some similarity between the proportions and shape of the unit and the proportions and shape of the space in which it is placed. A long narrow unit usually looks better in a long narrow space than in a square one. A circular unit fights with a rectangular

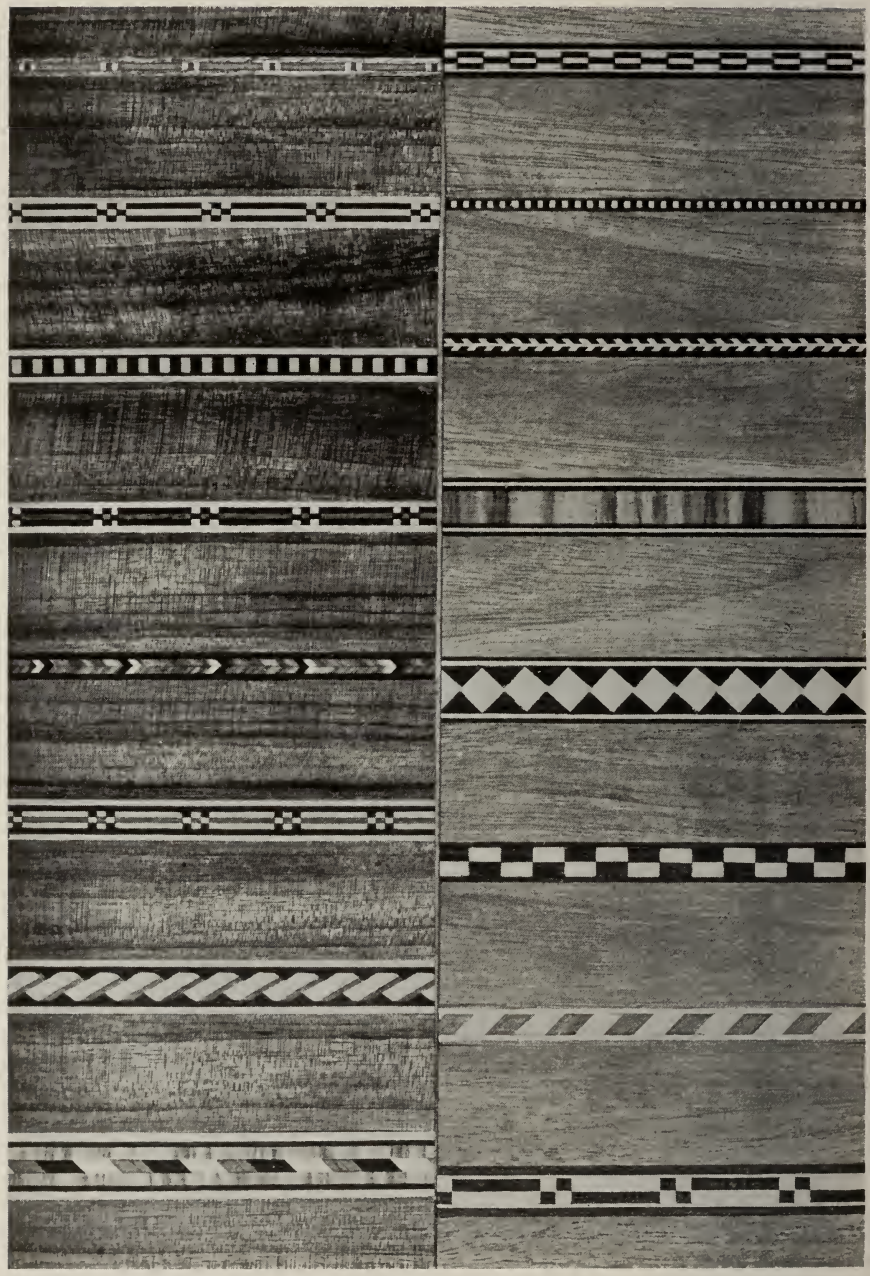


FIG. 9

FIG. 10

space except when the unit is small. Then there is no quarrel between them, for the space dominates thru its very size. As an example of this, one often sees a small wreath in a large rectangular space, and the result is pleasing. But if there is not this difference in size between the unit and the space it decorates, one should be sufficiently modified to harmonize with the other. Every one knows, in theory, that totally unrelated things, when put together cannot produce harmony, but in practice it is often forgotten.

Another method of using inlaying, besides breaking up spaces with it, is to use it to emphasize structural lines. Borders lend themselves to this purpose particularly well. If the border is appropriate to begin with, it is sure to be in harmony with the piece of furniture it decorates in this way. See Fig. 2. This very calling of attention to structure has the charm of frankness about it. Tho it seems simple, to do it well takes careful weighing of the factors we have been discussing. This simple outlining of drawers and panels, or any other structural part, was not so simple as to be scorned by the master craftsmen of "period furniture" who made it one of their chief methods of bringing their work to its last possible perfection. When decoration goes counter to structural lines it becomes so glaring that it draws all the attention to itself. As the decoration is less important than the furniture it enhances, it certainly should be subordinated to it.

Practically this whole question of choosing an appropriate inlay resolves itself in each instance into balancing to a nicety the degree of importance due respectively to the inlay and the piece of furniture it decorates. Tho one uses "ready made" marquetry it must now be evident that quite a serious problem, the wise selection and the best placing of it, is still left for him to solve, and that it is a problem that involves all the principles of applied design.

A SIMPLE PROBLEM IN ARCHITECTURAL DRAFTING AND CONSTRUCTION

HARRY L. JONES

THE building shown in the illustrations of this article is a study hall accommodating twenty students when sitting around three tables running widthwise of the building. It was designed by students in the manual arts department of the West Somerville, Mass.,

STUDY HALL, UNIVERSITY OF WISCONSIN

high school and built by summer session students at the University of Wisconsin in 1914. The building is now upon the camping grounds of the university which is used by summer session students who desire the out-of-door life while spending their summer months in study. All openings in the building are screened. The shutters, hinged at the top, protect the occupants of the building from the elements of the weather, and in the winter they are dropped and locked, thus serving to securely seal the building while it is not in use.

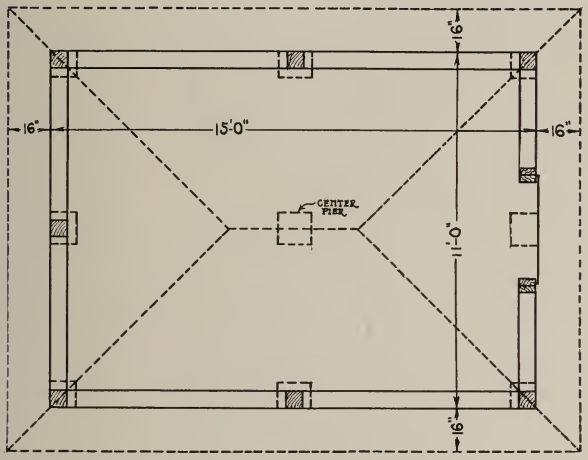
From the standpoint of instruction the purpose in assigning this problem was to present the subject of modern building construction to

those preparing to teach in high schools. The following is a brief outline of the work:

Instruction was first given regarding general building and how it could be handled by high school pupils. Next, methods of floor, wall and roof framing, door and window openings were studied, and the reading of the same from working drawings. Finally, as the time drew

PLAN OF A STUDY HALL

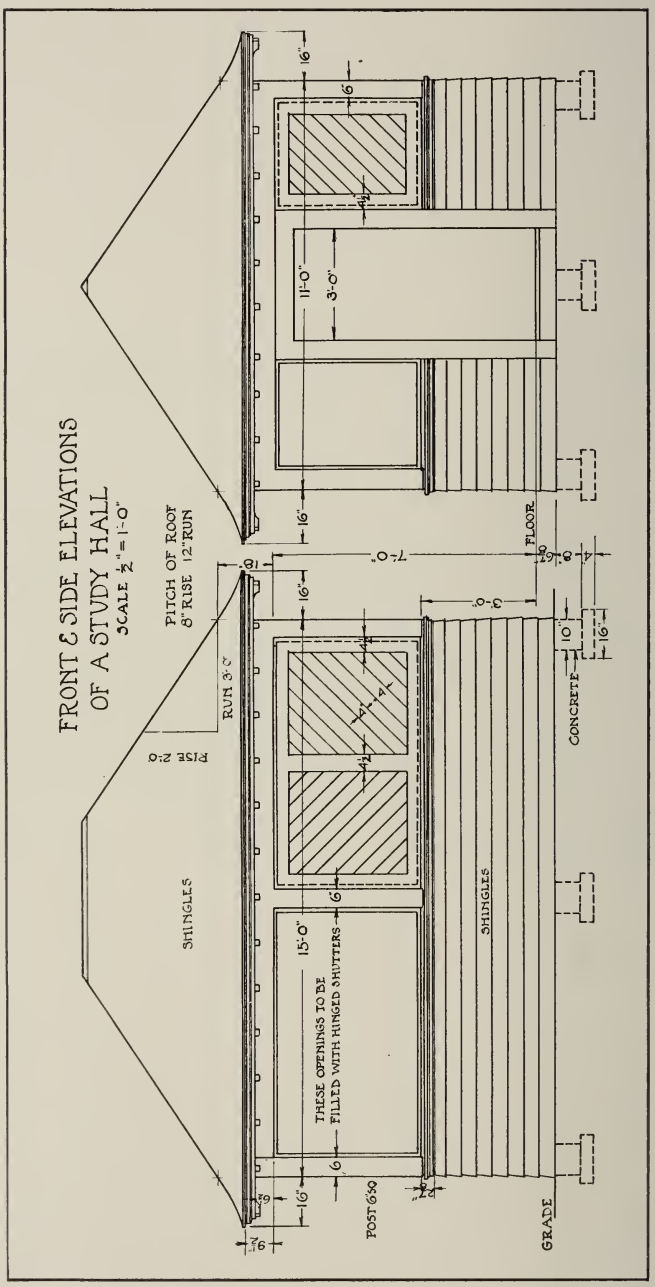
SCALE ⅜ INCH = 1 FOOT

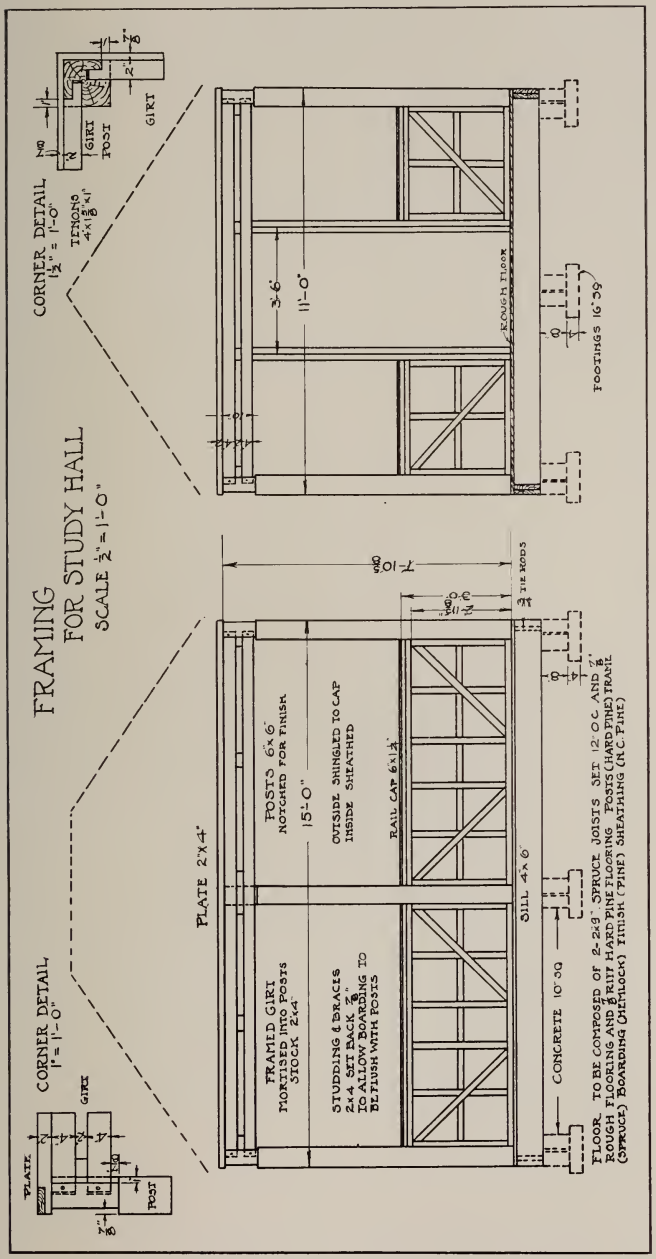


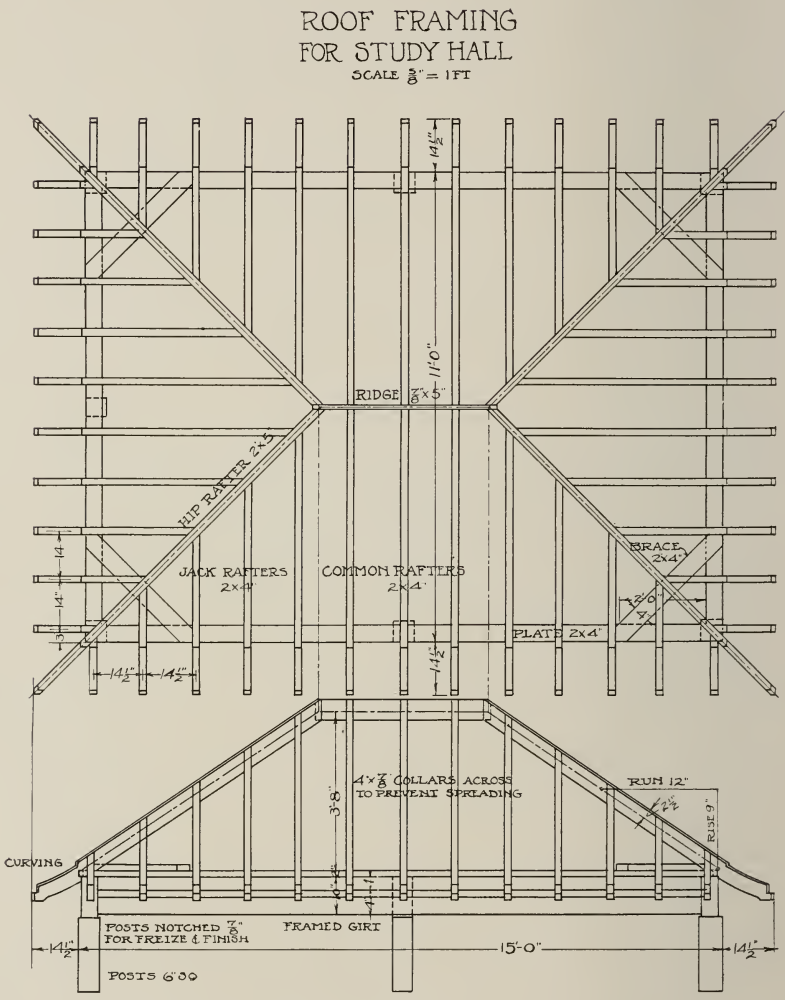
near for the actual work, local building customs, conditions and processes were discussed.

During the period of work on the foundation piers by the cement construction class, the time was occupied by getting out the framing—sills, floor joists, posts, plates and roof timbers. The roof framing was worked out by drawing and steel square methods, and the principal framed parts of the building were set up on the shop floor. The class had the use of the wood shop machinery for all necessary cutting and outside finish, the work being carried out from working drawings, scale and full size. The roof was hipped, giving opportunity for the cutting of hip, common and jack rafters. The sweep of the roof gave further opportunity for curved rafter cutting.

The work was assigned to the different members of the class and from time to time, as the opportunity presented itself, instruction in


FRONT & SIDE ELEVATIONS
OF A STUDY HALL
SCALE ½" = 1'-0"
PITCH OF ROOF
8" RISE 12" RUN
RISE 2'-0
RUN 3'-0"
SHINGLES
SHINGLES
THESE OPENINGS TO BE
FILLED WITH HINGED SHUTTERS
15'-0"
11'-0"
3'-0"
7'-0"
FLOOR
CONCRETE
GRADE
POST 6x6


FRAMING
FOR STUDY HALL
SCALE ½" = 1'-0"
CORNER DETAIL
1" = 1'-0"
GIRT
PLATE
POST
CORNER DETAIL
1½" = 1'-0"
IMONS
4"x1⅜"x1"
GIRT
POST
GIRT
PLATE 2"x4"
FRAMED GIRT
MORTISED INTO POSTS
STOCK 2"x4"
POSTS 6"x6"
NOTCHED FOR FINISH
15'-0"
STUDDING & BRACES
2"x4" SET BACK 2"
TO ALLOW BOARDING TO
BE FLUSH WITH POSTS
OUTSIDE SHINGLED TO CAP
INSIDE SHEATHED
RAIL CAP 6"x1"
SILL 4"x6"
CONCRETE 10'-0"
3'-6"
11'-0"
ROUGH FLOOR
FOOTINGS 16'-0"
FLOOR TO BE COMPOSED OF 2-2"x9" SPRUCE JOISTS SET 12" OC AND 2"
ROUGH FLOORING AND ¾" HARD PINE FLOORING POSTS (HARD PINE) TRAE
(SPRUCE) BOARDING (DRESSED) FINISH (PINE) SHEATHING (N.C. PINE)


ROOF FRAMING
FOR STUDY HALL
SCALE 3/8" = 1FT
14½"
11'0"
RIDGE 7/8"x5"
HIP RAFTER 2x5
JACK RAFTERS 2x4"
COMMON RAFTERS 2x4"
BRACE 2x4"
PLATE 2x4"
14"
14"
3"
14½"
14½"
14½"
14½"
4'0"
4'
4'x7/8" COLLARS ACROSS TO PREVENT SPREADING
3'8"
RUN 12"
RISE 9"
CURVING
POSTS NOTCHED 7/8" FOR FREIZE & FINISH
FRAMED GIRT
15'-0"
14½"
14½"
POSTS 6"x6"

methods adapted to high school work was given. The openings for doors and windows were provided with screens for summer use, and sheathed shutters for winter closing. The whole building was treated with two coats of paint for the finish, and the shingled walls with creosote. When completed the whole had a harmonious setting as to location and color.

The spot selected for the building was a beautiful one about two miles from the campus along the lake shore. Each day the university motor boat transported the class, tools and material.

The architectural drafting class used the problem as a subject for design and for the reading of working drawings; plans, elevations, details, shadows, perspective, and pen-and-ink rendering. The design followed that of a previous building used as a shelter on the campus, and constructed during the summer session of 1913.

This building is a good problem for any high school class, and can be adapted to small structures, or where a boat house, summer house or garage is required.

MADE IN SANTA MONICA, CALIFORNIA

WOODWORK FOR THE JUNIOR HIGH SCHOOL

ROBERT C. CRAIG

IN THESE days of regeneration of shop courses, the teacher of industrial subjects is often at a loss to decide whether or not his course has a justifiable place in the school curriculum, and if so, whether its content is such as will be of the most benefit to the student. In the past, shop courses have been defended as cultural; in the present, the tendency is toward industrial specialization. In this article I will at-

FIG. 1

tempt to justify a course in woodworking for the lower grades of the high school, or the junior high school, on the ground that it has a common interest for both the head and the hand workers, while it has also industrial possibilities, if properly presented. A boy is likely to derive little real benefit form a course which is entirely separated from the industry which it represents, but at the same time, it is a rank injustice to shunt a normal individual into the narrow field of some specialized work, by opening possibilities which an immature judgment is incapable of analyzing correctly. A school should teach its students to enjoy the living which it helps teach them to earn.

One can speak most definitely from one's own experience, and I make this the excuse for here citing some of my own efforts, which, while they are largely experimental, are along the lines which, it seems to me, will be of the most benefit to the most students. Obviously, we cannot give courses in all the industries—there are too many of them.

Therefore, if we do give vocational work, it should be in those courses which cover the broadest field. That, in the average community, woodworking is one of these may be authenticated by reference to the "Occupational Statistics of the United States" lately published by the census bureau. Even here, however, there must be some elimination. We cannot give specialized instruction in all the different phases of woodworking, but by selecting those branches of the industry in which general as well as industrial training may be emphasized, we can determine the

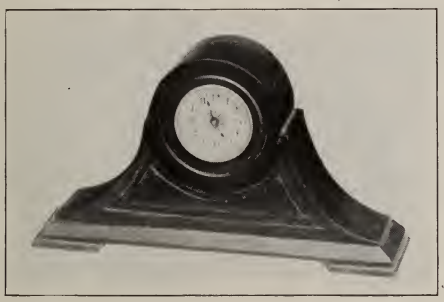


FIG. 2

content of the course which will be best fitted for school work. In this way, it seems to me that the field may be narrowed down to one course for lower high school work, namely, furniture and cabinet-making. This is an excellent medium for instruction in hand tool processes, it relates automatically to home interests, and instruction in industrial conditions is a natural correlation. Therefore, I will endeavor to present what, in my opinion, seems to be a justifiable course in this work when viewed from any angle.

The work here represented is done in the second semester of the ninth grade, or first year of the high school, the boys having had instruction in general tool processes and simple construction in the first semester. A great many schools make this division of woodworking a course in wood-turning. Professional wood-turners are few in number, and as a branch of the woodworking industry, turning is negligible. The lathe is simply a tool, albeit, one with which every woodworker should be familiar. The beginning of this second division of the course is a good place to give instruction in the use of the lathe, but, it has been my experience that six weeks, one and one-half hours per day, is sufficient time for the average boy to learn to use the lathe adequately. Perhaps

some would say that even this is a longer time than is necessary.

The remainder of the term may be used in making pieces of furniture involving turning, or other means of refining the work, such as simple carving. The projects should be suited, of course, to the boy, which will naturally involve individual instruction. The boy who has difficulty in mastering his tools should be given a piece of simple construction

FIG. 4

FIG. 3

such as the stool, Fig. 1, but by careful attention to the design, the finished product may be made one which will compare very favorably with the more elaborate pieces. For the boy who likes the close, rather fine work, something of the nature of the clock, Fig. 2, may be given. I might add that the boys who made the two foregoing pieces, tho they started rather slowly, finished with a fine burst of speed which made it necessary to find other work for them before the end of the term.

A project such as the electric table lamp, Fig. 3, is a good one to stimulate a taste for fine constructive work, as instrument making, the piece involving, as it does, simple electric wiring and some metal work. A piece similar to the pedestal, Fig. 4, is necessary for the boy who likes the large and free way of doing things. The more elaborate pieces such as the sewing table and chair, Figs. 5 and 6, are of course given to the boys who are fast workers, and who can do either the large or the small work, and do it well.

I have found that the ability of a pupil to do a certain piece of work, depends quite a little upon his impression of its difficulty. If he is

given to undertsand that it is a hard thing to do, he will make hard work of it, and will in all probability, botch it up; but if he is simply shown the process, and told to go ahead, he will take it as matter of course, and will turn out good results.

Along with the shopwork, the boys are taught the elements of good design. Good pieces are studied for principles. Simple methods of

FIG. 5

FIG. 6

adding interest and refinement are considered, and attention is given to good and bad construction. In this way, the course is made of value to the student who does not continue in the work.

Lectures are given on conditions in the woodworking industry, regarding manufacturing processes, (illustrating in the school mill-room when possible), various lines of woodworking, factory conditions, wages, hours, hazards, demands for workers, unions and industrial legislation.

Taken as a whole the course is intended to add to the general welfare of the student, rather than to the dividends of his future employer.

EDITORIAL

DR. Charles A. Prosser, secretary of the National Society for the Promotion of Industrial Education, has been appointed director of the new William Hood Dunwoody Industrial Institute of Minneapolis. This is the most important announcement in the field of industrial education that has come to our attention in several months. It is already known to our readers that the late William Dunwoody, a wealthy flour manufacture and banker of Minneapolis, provided in his will for a gift of three million dollars to found a school which should give instruction in "industrial and mechanical arts, including as of special importance the art of milling and the construction of milling machinery." The instruction in this Institute is to be "given free to the youth of Minneapolis and the state of Minnesota." Mr. Dunwoody wished to provide a place where the youth of his state could "learn the different handicrafts and useful trades, and thereby fit themselves for the better performance of life's duties." The trustees of the Institute are all business friends of Mr. Dunwoody and are endeavoring to make the gift entrusted to their care a vital factor in the educational system of their state. For this reason they have been very deliberate in choosing a director, and have finally chosen the man who, as deputy commissioner in charge of industrial education in Massachusetts, organized work which has been the model for other states, and who as secretary of the National Society has been the recognized leader in promoting legislation, both state and national, in favor of industrial education.

Charles A. Prosser

Mr. Prosser was born in New Albany, Indiana, in 1871. His father came to this country from Wales, where his people had worked for generations in the steel mills. After some teaching experience Mr. Prosser was for several years the superintendent of public schools in his native city, and during five years he was also judge of the juvenile court. His interest in social work led to his selection as superintendent of the schools of the Children's Aid Society, New York City, in 1909, which position he held during his second year of attendance at Columbia University, which was before he went to Massachusetts. Last January he was awarded the degree of Doctor of Philosophy by Columbia, his thesis being a study of the Mechanic Arts High School of Boston, which was made at the special request of the Boston School Committee. Mr. Prosser brings to the

work in Minneapolis a rich experience with men and policies in educational work, and the good-will of hundreds of those who have come in contact with him in the effective pioneer work he has been doing during the past five years.

Minneapolis Survey

Coincident with the announcement of Mr. Prosser's appointment as director of the Dunwoody Institute comes the statement that the city of Minneapolis is to begin an industrial survey almost immediately, and that Mr. Prosser is to be its director. He will be guided by a committee from the National Society for the Promotion of Industrial Education, of which Secretary of Commerce Redfield is president. The members of the committee are Charles R. Richards, director of Cooper Union, chairman; Leonard P. Ayers, director of division of education, Russell Sage Foundation; Dr. F. E. Spaulding, superintendent of schools, Minneapolis; Charles H. Winslow, expert in Bureau of Labor Statistics, Washington; and Mrs. Mary Schenck Woolman, specialist in industrial education for girls, Boston. Mr. Prosser and this committee will have the closest cooperation and support of the Minneapolis School Board, the Dunwoody Industrial Institute, the Minneapolis Art Institute, and the Civic and Commerce Association, each of which has detailed members of its force to work under Mr. Prosser's direction. It is estimated that the cost of the survey will be not less than fifteen thousand dollars. Like the Richmond survey, the findings and recommendations of this survey will furnish the basis for a large part of the discussion at the annual meeting of the National Society for the Promotion of Industrial Education which will be held in Minneapolis in Jaunary, 1916.

This announcement coming so soon after the vocational survey of Minneapolis in 1913 and the taking of Dr. F. E. Spaulding from Newton, Mass., to be superintendent of public schools of Minneapolis would seem to indicate that the people of Minneapolis propose to secure both the men and the facts that will enable them to put into successful operation a comprehensive and efficient scheme of industrial education which will be second to none in this country. The work of this survey is sure to be studied with as great, if not greater interest than that of the Richmond survey of last year.—C. A. Bennett.

California's Expositions

Out of a multiplicity of impressions resulting from only brief visits to the Panama-Pacific Exposition it is not easy to select any one thing as of greatest interest or significance. It is probably true, however, that the visitor from the East is

most appealed to by the general exterior, landscape and architectural arrangements of the expostion, and particularly by the charm of the coloring and lighting effects. A large element in the general result is produced by the judicious, yet almost lavish, use of tropical verdure, together with an unprecedented profusion of flowering plants. In addition, the Exposition seems to indicate the last word in the use of color in exterior decoration, carried even to the extreme of exterior mural paintings in protected loggias and cloisters, and also in electrical illumination. The wonderful effects produced entirely by indirect lighting have never been approached before. The grounds contain innumerable pictures of the greatest charm, that tempt the appreciative spectator to sit for hours observing the transformations that take place from what is seen under the dazzling glare of the afternoon sun, thru the changes of the soft cool twilight, the gradual illumination as darkness falls, to the brilliance and yet subdued grandeur of the mid-evening, followed by the entrancing gradual eclipse toward midnight. The expositions cannot be described; they must be seen.

The visitor who comes with memories of the Chicago and Saint Louis expositions, expecting to see "the greatest international exposition the world has seen," is sure to meet with some measure of disappointment. In neither extent nor comprehensiveness do the exhibits merit the use of the superlative. Nevertheless, they have been selected with great care and mounted, generally, with judgment and good taste. Some attention has been given in previous numbers of this Magazine to the educational exhibits, and a descriptive pamphlet has been prepared especially for teachers by a committee of the California Teachers' Association. The exhibits are well worthy of study, but doubtless many visitors with limited time at their disposal will succumb to the attractions of the beautiful out-of-doors and the endless succession of charming pictures in the settings of the groups of buildings.

The courage and optimism of California in conceiving and building two such expositions are significant. For it is worthy of note that the financial success of these enterprises depends upon the patronage of tourists who must travel thousands of miles and spend millions of dollars in the aggregate before they reach the gates. There is scarcely enough population west of the mountains to support even one exposition. California's expectations would be impossible of realization were it not that her extraordinary climate makes possible for the first time in this country the all-year-round exposition.

San Francisco Convention

It is doubtful if ever a convention presented to the committee in charge a problem more difficult of solution, or witnessed more heroically successful efforts on the part of such committee, than the meeting of the Bay Section of the California State Teachers' Association, held in San Francisco, April 5th to 10th. In anticipation of a large attendance the magnificent new Civic Auditorium was engaged, with its main auditorium seating 19,000 people, besides numerous smaller halls. The attendance greatly surpassed all expectations, and the audience at one session was estimated at close to ten thousand. This was the first use of the immense auditorium for a convention. There was considerable anxiety as to its suitability in the matter of acoustics, tho preliminary experiments seemed to promise a reasonable degree of success.

The first session demonstrated clearly, however, that the speakers were unable to make themselves heard. The officers of the Association, displaying characteristic California spirit, philosophically set about remedying the situation of which they were the victims. They at once secured the services of a contractor and a representative of the architect of the building, and began a series of experiments that lasted thru the entire night, and resulted in the construction of a huge canvas booth on the principle of the megaphone. This arrangement made it possible for speakers at succeeding sessions to make themselves heard with fairly satisfactory results.

It is impossible to refrain from paying tribute to the hearty good fellowship and hospitality of the Pacific Coast, especially as exemplified by the officers and members of the California Teachers' Association, the Schoolmasters' Club, and the Association of Applied Arts and Sciences. To meet such hosts and hostesses, to be greeted by them, and to be entertained by them are privileges never to be forgotten.

—William T. Bawden.

OF CURRENT INTEREST

THE CHICAGO CONVENTION

THE convention of the Western Drawing and Manual Training Association held in Chicago, May 5th to 8th, was successful in attendance, in its exhibit, its finances, its program and its spirit. There has come to be an atmosphere of friendly cooperation about the meetings of this association which is easily recognizable. Some one said, "It is one happy family." In some respects this is true. There is certainly the open minded attitude toward any speaker with a message, a whole-hearted appreciation of efficient service and a desire to help each other.

This year the Association was fortunate in at least three directions: First, in its president, Miss Florence H. Fitch of Indianapolis, who handled every situation with such skill and grace as to win praise from everyone. Second, in having an ideal meeting place. The excellent lecture hall of the Art Institute, its ideal space for school exhibits and its own collections of pictures and other works of art and craftsmanship cannot be equalled in the territory covered by the Association. In the third place, the hospitality and efficiency of the local committees were all that could be desired. The program, too, was a strong one in that it was well calculated to meet the great variety of interests in the Association, and in that it made attendance upon all sessions possible. Consequently there was no rushing from one sectional meeting to another, and no disappointments because two valuable papers appeared at the same time on the program. The program was not over-crowded; speakers kept within their time limits; there was time for everything.

There are several things which might in truth be said of the school exhibits which will not be stated here, but we will mention three facts: First, with the exception of the work from the Chicago public schools there were hardly any manual training exhibits; second, color work in full chroma was a feature of the display, and the interest in this seemed to center in the work in opaque color from Teachers College, New York City; and third, a strong movement toward needlework as a medium in applied design was apparent. It may be only a coincidence that the last two work together admirably; strong color finds appropriate use in needlework. The fact that artistic needlework is coming forward in

school work is a source of satisfaction to those who have been looking for more practical work in design. Compared with some other forms of applied design work given to girls, needlework bears a relation of about ten to one in the number of times it can be made useful. Perhaps domestic art is now coming to its own in school work.

To get an adequate idea of the program one should read the book of proceedings which, we understand, will be issued very early this year.

THE WEAKEST LINK—THE HUMAN ELEMENT

The program of the Chicago meeting was sufficiently varied in character to interest all groups of members in the Association. To summarize it adequately would be impossible in the space available. We have therefore chosen to call attention to one address which gave emphasis to certain social phases of the industrial education problem—to the address entitled "The Weakest Link" by Robert J. Leonard, professor and director of vocational education Indiana University. The weakest link in modern industry, said Mr. Leonard, is the human element. "An industry is no more socially worth while than its weakest phase." "An industry to be justifiable today must minister to the health, and to the spiritual, moral and economic welfare of all concerned: the workers, the consumers, and the manufacturers or the capitalists whose money is invested in the business."

Then turning attention to the schools Mr. Leonard said,

> The great majority of boys and girls upon leaving school and going to work enter an industrial situation and life of which they know little or nothing. They know relatively more about the materials of industry and industrial processes than industrial life, for the products of industry have been an organic part of their environment, and the materials of industry have been handled in the schools.
>
> At the present time, there is an honest difference of opinion regarding specific technical vocational education in the public schools for many pursuits, but can there be any difference regarding the obligations of teachers and the schools in attempting to provide children with the necessary background so as to enable them to ultimately understand industrial life and all that it means?
>
> Some contend that the technical phases of wage earning may be best learned in the shop or factory, but the industrial situation can never be interpreted without the background of industrial history and biography and industrial evolution, which, to reach the masses, must be taught in the schools.

Among our membership are teachers of industrial subjects, teachers of fine arts and home economics. The courses of study which we now administer in the various schools which we represent and the exhibits at this meeting show conclusively that we, like manufacturers, are more interested in production,—quantitative and qualitative production, than in the human problems involved.

* * * The main purpose of the industrial and related courses in the schools today must be to introduce children to the life of the time. If we fail to do this, we are assisting in industrial exploitation and we are contributing to human waste, for ignorance of the modern situation is the best means of perpetuating it.

A new industrial day must dawn. If we are to develop a democracy, new industrial ideals must dominate. But new standards in industry will never become operative without the rank and file, the workers themselves, have the basic knowledge and training concerning the whole situation necessary to indicate how to point the way toward the path of progress. The fight for reasonable hours of work, for a living wage, for the elimination of child labor, for workmen's compensation and insurance, for guarding human life from occupational diseases and hazards, would have been won long ago if the workers themselves had received the vision of a new industrial era in the public schools.

Mr. Leonard outlined in some detail the social phases he had in mind, and then added,

Without adequate attention to the aspects of industrial life enumerated, young people will continue to enter in increasing numbers an industrial situation of which they are ignorant, and such entrance will still be characterized by waste and inefficiency. The burden of attempting to carry out this program rests upon us. We cannot shift it to the teachers of so-called academic subjects, or classroom teachers, for if we do, the teaching will lack that vital touch connection with project work which is absolutely essential.

The carrying out of such a program presupposes that we are thoroly acquainted with industrial life. It may be, however, that we are not prepared at the present time to properly cope with the situation. Teachers in increasing numbers, however, are becoming perpared for this advanced step by supplementing their professional training and teaching experience with a period of industrial employment, social service, industrial study or survey work, or some other form of activity designed to familiarize them with the situation as it actually exists.

The greatest opportunity for rendering the highest service to the coming generation is ours. We cannot fail, for the consequences of such failure are too great and far reaching.

CONFERENCE ON TRAINING PRACTICAL ARTS TEACHERS

The second annual conference on "The Training of Teachers for the Practical Arts Subjects to be Taught in the Regular Schools" was held in Indianapolis, April 6, Charles A. Greathouse acting as chairman.

The purpose of the meeting was to discuss several circulars issued by the vocational division of the Department of Public Instruction, which focused the discussion on three points—training domestic science teachers, specialization for Class A teachers, examination and certification of teachers and future course outlines.

In the discussion relative to the training of domestic science teachers, the general concensus of opinion of those present favored the idea presented by W. F. Book that teachers should be so trained as to approach the subjects from the problem standpoint, first studying the local community and determining its interests and needs, and then adapting courses and instruction to the desired ends.

The discussion of the second topic, specialization for Class A teachers, centered around the question of the degree of specialization in the respective fields desirable for Class A teachers. Some were of the opinion that the practical arts courses for Class A teachers should be general in nature, covering in outline the entire field, and that subsequent courses should consider more intensively certain units or parts of the general course, while others contended that instruction, to be efficient, must be organized about a single unit and involve an intensive study of this unit, and that subsequent courses should consider in like manner the other necessary units.

In considering examinations and certifications many seemed to think that the present system is not strict enough. The example was cited of a young woman who passed the industrial art examination with a grade of 94, in spite of the fact that she had never studied the subject, and some one told of a student who had had but one month's training in industrial arts and successfully passed the examination for special teachers. President Stone expressed the opinion that any examinations which might be framed in these subjects could be passed by any one having read a textbook on the subject, and that examination questions could not be framed so as to test teaching ability. President Stone also emphasized the fact that twelve weeks of summer school was not adequate preparation to teach industrial arts. It was suggested that a license might be issued to young women with twelve weeks' training in domestic science to teach only the parts of the subject in which they had been trained.

In the discussion of the course outlines for the future, the general feeling seemed to be that the outlines should be more definite and concrete. W. F. Book showed that there was considerable danger in pre-

paring at this time definite course outlines, as this might prevent institutions from working out the problem in an original and experimental way. R. J. Leonard suggested that aside from preparing course outlines, the problem of actually organizing instruction in keeping with the outlines prepared was equally important, and that in order to accomplish this, heads of departments and teachers of all institutions must share in the preparation of course outlines if they are to become effective and binding thruout the state. It was agreed that the outlines presented for discussion, represented, in a general way, the beliefs of those present at the conference.

AN EDUCATIONAL MUSEUM

The Educational Museum of St. Louis Public Schools is a traveling museum which goes to each school carrying illustrative material at the time it is needed. This interesting museum has been described by Carl Rathmann, assistant superintendent of schools, St. Louis, in an article printed in one of the bulletins issued by the United States Bureau of Education. The following is largely a quotation from this article.

The museum material is sent to the schools by a large automobile truck in the service of the museum. The schools are divided into five sections, each of which has a delivery day once a week. The principal of a school which has its delivery day on Monday asks his teachers on the preceding Friday to send him the numbers of all the collections in the museum catalogue they will need for the illustration of their lessons during the following week. These numbers he inserts in an order blank for the curator, and on the following Monday the wagon delivers the material at the school, taking back at the same time the collections used during the previous week.

This material is arranged and grouped in accordance with the course of study followed in the schools. The following are some of the groups that are of special service to the industrial arts departments (the other departments are equally well provided for); industrial products, showing the various stages in the maufacture of glass, paper, leather, ink, pen, pencil, needle, etc., beside such products as are made from the materials in other groups, food products, and materials for clothing. The groups are subdivided into smaller collections. Each collection is accompanied by a number of photographs, stereoscopic pictures, and lantern slides. The collections are numbered and listed in the museum

catalog. With each article mentioned a brief explanation is given as to its use, where it is found, etc. A number of reference books are listed. These books are found in the teachers' library which is connected with the museum. This library contains 10,000 volumes: the best publications on philosophy, psychology, education, school management, science, and literature, the textbooks used in our own and other countries, reports and courses of study of the schools of the United States and Europe, reference books giving information on all the material in the museum, and the leading educational and other magazines. The teachers are asked to state what they would like to have added to the library, and their suggestions always meet with ready consideration. The desired books may be called for or ordered by means of an order blank. In the latter case they are delivered by the museum automobile.

The museum now occupies a part of what was once a school building. That part was remodeled to suit the needs of the museum. A large portion of the floor space has been arranged as a display department. Here each kind of collection sent out by the museum is shown in its proper sequence that teachers may see what the museum contains. The museum proper, the traveling museum, is found in thousands of boxes, cases, and jars ready to go out to the schools.

All collections returned from the schools are unpacked, checked, and examined. Soiled or missing labels are at once replaced, damaged articles sent to the repair room, and all glass and boxes and cases carefully cleaned. Two men repack all the material, and make it ready to go out again. The boxes and other receptacles, for the various articles are all so constructed as to give the best protection and to keep the exhibits in usable shape as long as possible. There are 7,000 collections, including duplicate collections, in this traveling museum. The teachers and pupils seem to feel they are responsible for the care of the material loaned them and they show commendable care in handling it. The annual loss of exhibit material has been comparatively small.

Under the caption "How Can a School Museum Be Established" Mr. Rathmann suggests that in cities in which there is a public museum, opportunities for the systematic use of its material should be given. The public museum should establish a school section; it should gather from its stores such material as can and should be used in the schools and make it possible for teachers to get it when they need it. But even in places where there is no museum the establishment of a school museum is not as difficult a matter as it is generally supposed. A great deal of

the material in daily use in the St. Louis schools can be had from commercial firms in the city and in other places, much of it for the asking. The United States Department of Agriculture, the Bureau of Fisheries, as well as privately owned mines and quarries, will give assistance. Pictures gathered from magazines and railroad and steamship advertisements may be arranged and classified. With material procured in this way as a nucleus and with purchases of other material in this country and abroad, a serviceable school museum can soon be developed.

SOME REAL WORK DONE IN UTAH

When the high school opened September, 1913, in Grantsville, Utah, the pupils discovered that the eight new rooms that had been built during the summer were absolutely vacant, and that $350 worth of lumber was on the premises. The boys, only thirty-two of them in all, together with their new manual training teacher, Parker B. Pratt, undertook to equip these rooms. They were not at all daunted by the fact that only two of the boys had ever had any manual training before.

That they met with difficult and varied work may easily be guessed when it is known that these eight rooms were a woodwork shop, a drawing room, a chemistry laboratory, a physics laboratory, a domestic science room, a kindergarten ,a grade school assembly room and a gymnasium. To accomplish all this in the first half year of school, these energetic boys worked Saturdays and holidays in addition to the ninety minutes a day of regular class time. Before beginning the work on the eight rooms they assembled and screwed in place 200 new desks that had been bought for the grammar school.

After the movable and built-in furniture was made for the first six of the above mentioned rooms the boys met a very different problem, the laying of a maple floor in the assembly room, a floor measuring 1,800 square feet. Their success in this encouraged them to floor the gymnasium, a room 40 by 70 feet. The gymnasium had been standing idle since the beginning of school, for the lack of funds to have the floor layed. The enthusiasm of the boys for this new undertaking must have been contagious for the faculty and the girls offered to help them. Together they bored 350 four-inch holes in the concrete floor, levelled and lag-screwed the floor strips to the concrete, laid 2,800 square feet of pine sub-floor and then in ten hours topped that with a maple floor. The faculty and the girls were as happy "workmen" as were the boys, in

spite of blistered hands. The "gym" floor was hand planed, hand scraped, and hand sandpapered, each four times by the boys. Later they made four maple-faced basket ball standards and installed them. When spring came the boys graded and fenced the school tennis court. The high school leased the town square, which had degenerated into a tangled mass of desert tumble-weed, greaswood, and sage brush. The

THE FIVE THOUSAND DOLLAR BRICK BUNGALOW BUILT BY THE HIGH SCHOOL BOYS AND THEIR INSTRUCTOR

boys cleared this, and then built a grand stand in it. The money for the lumber had been raised thru voluntary subscription and amounted to $140. On Arbor Day 160 shade trees were planted along the fence.

The manual training work of this first year saved the board of education $1,500. During the second half-year the boys were paid from twenty to thirty-five cents an hour for all extra time spent in doing work for the school. Not all of the work done the first year, however, was for the school. At the end of the year the boys took home many pieces of furniture and pieces of farm equipment. Among the latter was a 600 egg incubator.

During this first year one of the boys in the mechanical drawing class made plans for a $3,000 brick house. He had had no previous training in any kind of drawing. The house was built by a Grantsville contractor, who employed, among other workmen, three high school boys at $2.25 a day for a day of eight hours.

Mr. Pratt refused three house contracts that he and some of the boys who needed employment might build a house during the summer vacation. They built a $5,000 brick bungalow in Grantsville. The porches,

the cellar stairway, and basement were floored with cement. For the main windows, which are casement windows, the sills were cast on the ground, as were also the porch copings. The boys and Mr. Pratt did all the work on the house except the masonry, plastering, the cement finishing and part of the finish on the inside woodwork which was done by other workmen. They had quite a little cabinet work to do also, as the living room has built-in bookcase and a writing desk, the dining-room a buffet, and the kitchen a buffet cupboard, lockers, bins and a dumb waiter to the basement. The boys earned from $2.00 to $3.00 a day while working on this job. Beside the house itself the boys built barn sheds, a granary, chicken coops, and did part of the work on the tank house which is elevated to throw water over the main house roof. Perhaps the first septic tank sewer system—three compartments—ever installed in Utah for a private dwelling was put in the house after the plans made by Mr. Pratt.

With very little help from others some of the boys built another house, a modern summer bungalow. Mr. Pratt made the plans for this. It has a ventilated dining-room and one ventilated bed room and two that are closed, a screened living room and kitchen and a front and back porch. Less than $50 worth of work was done on this house by regular workmen.

SHOP NOTES AND PROBLEMS

ALBERT. F. SIEPERT, Editor

FRAMING TABLES FOR THE SQUARE AND OCTAGONAL ROOF.[1]

Argument:—A lumber dealer should know how to figure B. M. of a stick of timber in the "good old fashioned way." He does know, but—he does not make use of the "good old fashioned way" when he estimates—he uses a table.

A banker should know how to figure percentage, discounts, etc., in the "good old fashioned way." He does know, but—he does not make use of the "good old fashioned way" in his office—he uses tables.

A carpenter should know how to frame a roof "in the good old fashioned way" without the aid of tables, but if he is wise he will make use of tables constructed to relieve the minor detail.

The accompanying tables were constructed to meet the need of large classes of "short course" men in carpentry at the University of Missouri—men who could give but seven weeks to the course. Such tables have their greatest significance when used by men who understand the fundamental principles of roof framing. However, they provided a quick means of teaching roof framing to these "short course" men.

DIRECTIONS FOR USING TABLE FOR THE STEEL SQUARE, FIG. 1.

Example:—Given a square hipped roof, that is, a roof with square corners, having a span of 23 ft. and a pitch of ½.

1. *To lay out miter cut of plate*:—Take 12″ on tongue of framing square and 12″ on blade, scribe along blade. (Cf. small table at right, Fig. 1.)

2. *Length of Ridge*:—Length of long plate diminished by length of short plate, increased by thickness of ridge piece, plus diagonal thickness of hip.

3. *To Lay Out Common Rafter*:—

a. Plum cut.—(Cf. column 4, beginning at left, Fig. 1). Take 12″ on tongue of square and 12″ on blade (column 2) scribe along blade.

b. Length of common rafter.—(Cf. column 10) 12½ (run of common rafter) x 16.97″ (length of common rafter per foot of run)=17′ 8.12″=17′ 8⅛″ (.12″ =⅛″, columns 3 and 1).

c. Seat cut.—(Cf. column 7). Take 12″ on tongue and 12″ on blade; scribe along tongue.

[1] This contribution from Professor Griffith of the department of manual arts of the University of Missouri is presented at this time to be available for teachers of carpentry who will have classes during the summer schools and also for those teachers who expect to build houses, etc., with the aid of boys during the vacation. Since the value of any table depends upon its accuracy, Professor Griffith requests that everyone who finds errors upon a trial will communicate with him about the matter.—Ed.

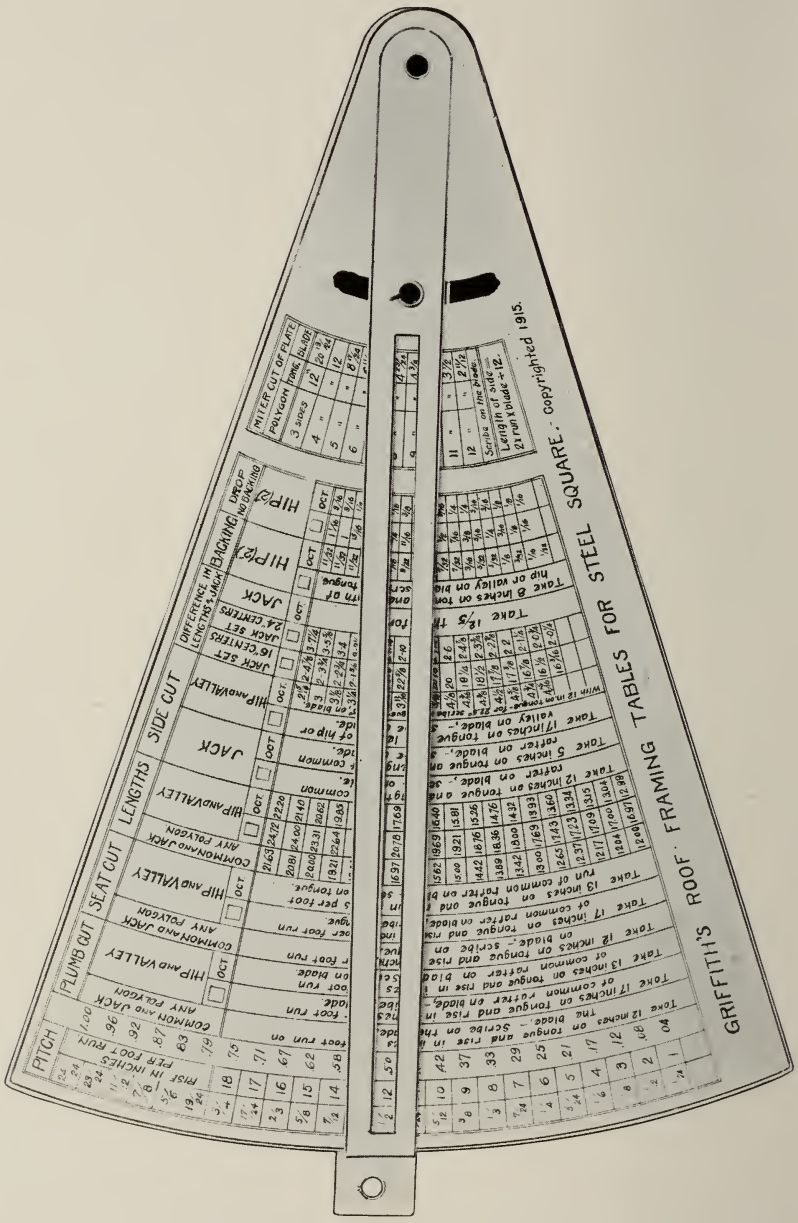

GRIFFITH'S ROOF FRAMING TABLES FOR STEEL SQUARE. Copyrighted 1915.
PITCH
PLUMB CUT
SEAT CUT
LENGTHS
SIDE CUT
DIFFERENCE IN LENGTHS
BACKING
DROP NUMBERS
COMMON AND JACK
HIP AND VALLEY
JACK
HIP(2)
MITER CUT OF PLATE
Length in of side
Scribe on the plumb
Take 12 inches on tongue and rise in the blade. Scribe on the
Take 17 inches on tongue and rise in the blade. Scribe on the
Take 13 inches on tongue and rise in the blade. Scribe on the
Take 5 inches on tongue and rise in the blade. Scribe on the
Take 12 inches on tongue and rise in the blade. Scribe on the
Take 13 inches on tongue and rise in the blade. Scribe on the
Take 17 inches on tongue and rise in the blade. Scribe on the
Take 12 inches on tongue and rise in the blade. Scribe on the

FIG. 1

b. Length of common rafter.—(Cf. column 10) 12½ (run of common rafter) x 16.97″ (length of common rafter per foot of run)=17′ 8.12″=17′ 8⅛″ (.12″ =⅛″, columns 3 and 1).

c. Seat cut.—(Cf. column 7.) Take 12″ on tongue and 12″ on blade; scribe along tongue.

d. Lookout for common rafter:

(1) Length—Determined as was that of common rafter, the horizontal projection or run of lookout becoming multiplier.

(2) End cut—Use same numbers as for plumb cut but invert position of square.

e. Reduction for ridge.—Measure straight back from plumb cut a distance equal to ½ the thickness of ridge piece.

4. *To Lay Out Hip or Valley Rafter:*

a. Plumb cut.—(Cf. column 5). Take 17″ on the tongue and 12″ on the blade; scribe along the blade.

b. Side cut.—(Cf. column 15). Take 17″ on the tongue and 20.78″ or 20 19/24″ (columns 3 and 1) on the blade; scribe along the blade.

This also gives the miter on hip for fascia at the end of the lookout of the hip, and also the miter cut at the bird's mouth joint of valley rafter, where it must be cut out to fit the angle of the plate.

c. Length of hip or valley rafter.—(Cf. column 11). 12½ (run of common rafter) x 20.78″ (length of hip or valley rafter per foot of run of common rafter) =21′ 7.75″=21′ 7¾″ (.75=¾, columns 3 and 1).

d. Seat cut.—(Cf. column 8). Take 17″ on tongue and 12″ on blade; scribe along tongue.

e. Lookout for hip or valley rafter:

(1) Length—Determined as was that of hip or valley rafter, the horizontal projection of run of the lookout of common rafter becoming the multiplier.

(2) End cut—Use same numbers as for plumb cut of hip or valley but invert position of square.

f. Reduction for ridge.—Measure straight back from plumb cut ½ diagonal thickness of ridge.

g. Backing of hip.—(Cf. column 20). Take 8″ on tongue and 20 19/24″ on blade, scribe along tongue for angle.

h. Drop of hip when no backing.—(Cf. column 22). Reduce seat cut $\frac{11}{16}$″.

5. *To Lay Out Jacks:*

a. Plumb cut.—Same as for common rafter.

b. Side cut.—(Cf. column 13). Take 12″ on the tongue and 16.97″ or 16 23/24″ on the blade (.97=23/24, columns 3 and 1), scribe along the blade.

Scribing along the tongue will give the face cut of roof boards, also plancher.

c. Length.—Jacks set 24″ centers, beginning with shortest jack=2′ 10″ (column 18).

Second shortest jack=length of shortest increased 2′ 10″, etc.

Beginning with longest jack=length of common rafter diminished by 2′ 10″, etc.

d. Lookout for Jack.—Same as for common rafter.

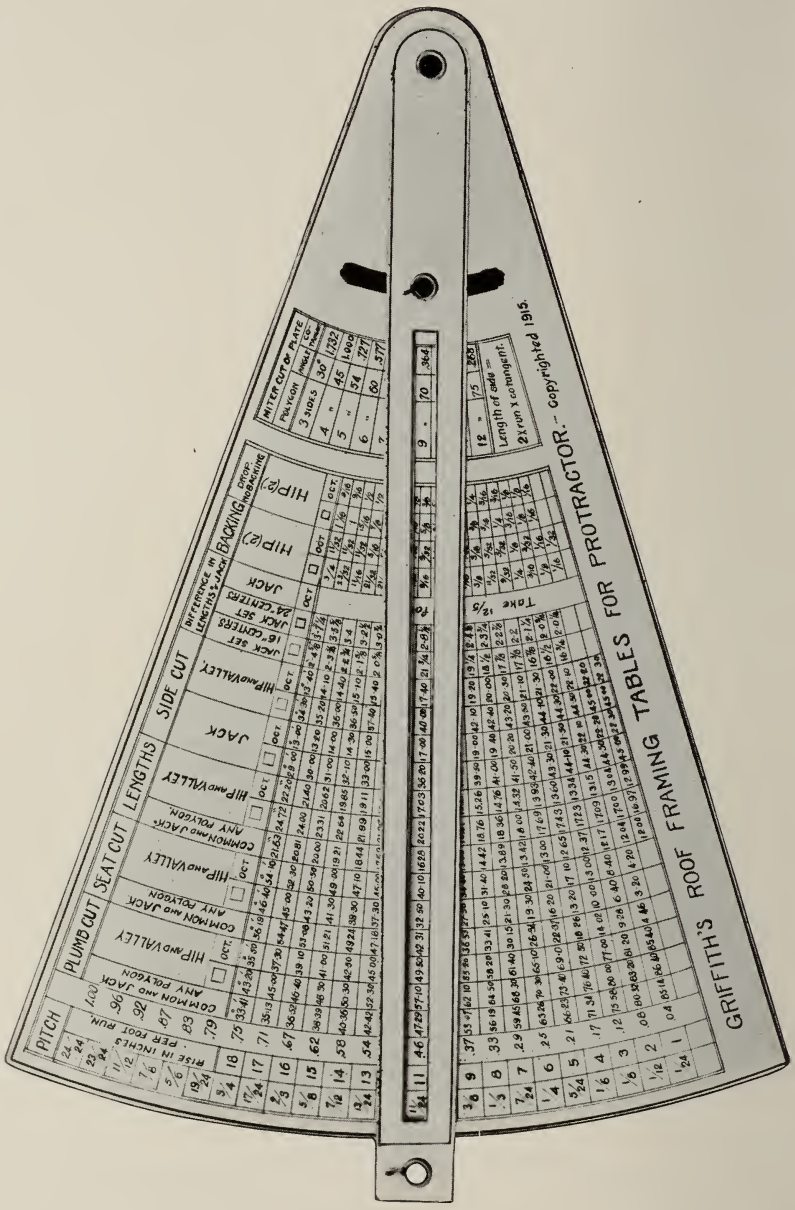

GRIFFITH'S ROOF FRAMING TABLES FOR PROTRACTOR.-- Copyrighted 1915.
PITCH
RISE IN INCHES PER FOOT RUN
PLUMB CUT
SEAT CUT
LENGTHS
SIDE CUT
DIFFERENCE IN LENGTHS
BACKING
HIP (2)
JACK
HIP AND VALLEY
COMMON AND JACK
ANY POLYGON
JACK SET 16 CENTERS
JACK SET 24 CENTERS
DROP OR RUN
Take 12/12
Length of side = 21 x run x cotangent.
Copyrighted 1915.

FIG. 2

6. Note:—All rafter lengths are measured down the middle of the top edges, theoretically.

On the square cornered roof measurements of hip or valley rafters may be made from the long point without further reduction in length, provided a 2″ thick ridge is used. Jacks need no further reduction in length on a square cornered building, provided the hips or valleys are of the same thickness as the jacks, and the measurements are made from the long points. Otherwise suitable reductions must be made for rafter and ridge thicknesses.

DIRECTIONS FOR USING TABLE FOR PROTRACTOR, FIG. 2.

Example:—Given, to frame an octagonal silo with a span of 21′ and a roof pitch of 11″ to the foot.

1. *To Lay Out Miter Cut of Plate.*—(Of small table at left, Fig. 2.) Eight-sided polygon, plate miter=67½ degrees. Set a T-bevel by means of a protractor to this angle.

2. *To Find Length of a Side For Plate.*—(Cf. small table at left.) 21′ (2 x run) x .414 (cotangent of octagon)=8.69′=8 17/24. (.69=8 17/24, columns 3 and 1.)

3. *To Lay Out Common Rafter*:

a. Plumb cut.—(Cf. column 4). 47 deg. 29 min. Set T-bevel by means of protractor to this angle.

b. Length.—(Cf. column 10). Take 10½ (run) x 16.28″ (length of common rafter per foot of run)=4′ 2.94″=4′ 2 23/24″. (.94=23/24, columns 3 and 1).

c. Seat cut.—(Cf. column 7). 42 deg. 31 min. Set T-bevel by means of protractor.

d. Lookout.—

(1) Length—Determined as is length of common rafter (Cf. column 10), horizontal projection or run of lookout becoming the multiplier.

(2) End cut—Use same number of degrees as for plumb cut.

4. *To Lay Out Hip or Valley Rafter*:

a. Plumb cut.—(Cf. column 6). 49 deg. 50 min. Use protractor and T-bevel.

b. Length of hip or valley rafter.—(Cf. column 12). 10½ (run of common rafter) x 17.03″ (length of octagon hip or valley per foot of run of common rafter)=14′ 10.32″=14′ 10 8/24″. (.32=8/24, columns 3 and 2).

d. Seat cut.—(Cf. column 9). 40 deg. 10 min. Use protractor and T-bevel.

b. Side cut.—(Cf. column 16). 17 deg. 40 min. Use protractor and T-bevel. This also gives miter cut of hip for fascia at end of hip lookout, and also the miter cut of the bird's mouth joint of valley rafter, where it must be cut out to fit the angle of the plate.

e. Lookout for hip or valley rafter.—

(1) Length—Determined as for hip or valley, horizontal projection or run of lookout of common rafter becoming multiplier.

(2) End cut—Use same number of degrees as for plumb out of hip or valley.

f. Backing of hip.—(Cf. column 21). Gage set=9/32″ for each side of rafter.

g. Drop of hip when no backing is used.—(Cf. column 23). ⅜″.

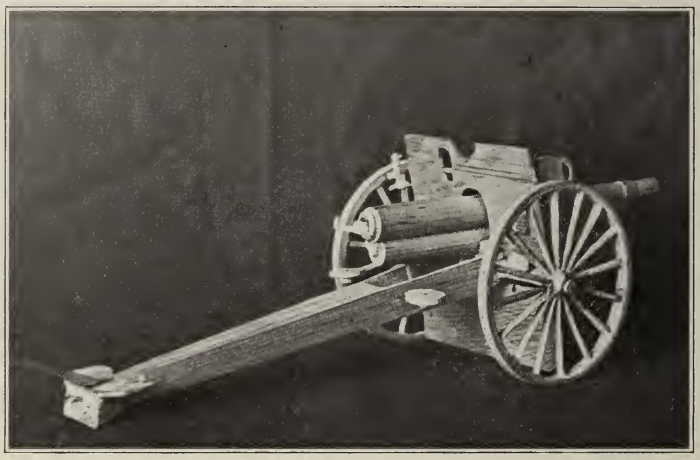
5. *To Lay Out Jacks*:

a. Plumb cut.—Same as that for common rafter.

b. Side cut.—(Cf. column 14) 17 deg. Set T-bevel from protractor.

c. Length.—(Cf. column 19). 12/5 that for square roof of same pitch. When set 16″ centers=12/5 x 21¾″=52 $\frac{1}{2}$″, common difference, etc.

d. Lookout for jack.—Same as for common rafter.



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REVIEWS

Commercial Work and Training for Girls. By Jeannette Eaton and Bertha M. Stevens. Published by the Macmillian Company, New York, 1915. 5x7¾ in.; 289 pages; illustrated; price $1.50.

The book is the result of an investigation made under the auspices of the *Cooperative Employment Bureau for Girls* (now called *The Girls' Employment Bureau*), Cleveland, Ohio— an investigation of the commercial work and training for girls in that city, made as a means of answering two urgent questions, namely: "Are girls refused in office work because there is an over-supply of workers in the field, or, because these girls are inherently unsuitable or improperly trained?" These questions were forced on the bureau by the unemployment of a large number of girls who had prepared themselves for office work. The work of solving the problem developed along two lines of inquiry—What kind of training is needed, and is it adequately given in Cleveland, and what are the demands and inducements for girls in the field of office work? The work was done by one woman, who devoted all her time for more than one year, assisted by twenty-five organized volunteer helpers. That the study of the situation was exhaustive can be seen from the following list of what they investigated;—1421 occupational records of as many office girls, 728 records of eighth grade public school pupils, 441 places of office employment, 451 interviews with business men, educators, and social workers, and the records of 52 business schools and courses (total number in Cleveland).

Food, What It Is and Does. By Edith Greer. Published by Ginn and Company, Boston, 1915. 4¾x7½ in.; 224 pages; illustrated; price $1.00.

This little book tells what food is and does, in such a simple and interesting way, notwithstanding technical terms and condensed facts, that one reads on and on and does not want to stop. The author suggests that in such schools as have no domestic science courses this book, if given to the children, would in some measure make up this deficiency if used as an informational reader on food, and that in other schools it could serve as supplementary reading.

Knitting for Infants and Juniors. By Ethel M. Dudley. Published by Sir Isaac Pitman and Sons, New York. 8½x6½ in.; 63 pages; illustrated; price 75 cents.

Directions are given for making models that require the use of only the simple knitting stitch, and others that necessitate only the added knowledge of the purl stitch. Nearly all of these are for dolls and for dolls' houses, and therefore of interest to small children. The book is illustrated with pen drawings of stitches, and photographs of actual dolls sweaters, caps, mufflers, etc., made by the children in the author's classes.

Dress Design. By Talbot Hughes. Published by McMillian Company, New York. 7½x4¾ in.; 350 pages.

This is one volume of the "The Artistic Crafts Series of Technical Handbooks" edited by W. R. Lethaby. It gives the history of dress from the prehistoric (based on supposition), thru the centuries, ending with the costumes of the Victorian period. The costumes from earliest history to the tenth century are briefly considered in four pages, those from the tenth to the fifteenth in forty-five pages, but those from that time on are described in detail, often including such accessories as head and foot wear. To facilitate easy reference, the costumes are studied with reference to historic peroids, and the attire of men and women is treated separately. The book is profusely illustrated with 118 pen sketches and 33 photographs. Many of the photographs are of people dressed in some of the quaint costumes from the author's collection. In making the photographs mirrors were so placed that one sees each costume in its entirety. As the book was written not only for those interested in the historic side of the subject, but for designers and dressmakers who might wish to reproduce the costumes, the last quarter of the book consists of 68 patterns drawn to scale.

The Stranger: A Modern Miracle Play. By James Parton Haney, director of art in the high schools of New York City. Reprint from the February, 1915, issue of *Good Furniture,* published by the Dean-Hicks Company, Grand Rapids, Michigan. A very clever piece of writing in which the very practical "Stranger" in the course of a little play of four scenes and an epilogue becomes recognized as Art.

RECEIVED

Education for the Home. By Benjamin R. Andrews, assistant professor of household economics, Teachers College, Columbia University, New York. Part III, Colleges and Universities. Buletin No. 38, 1914, published by the U. S. Bureau of Education, Washington, D. C. Contains typical college curricula in education for the home, outlines of individual college courses, and data on college instruction.

Model Farm Houses. By Maurice I. Flagg, director of the Minnesota State Art Society, St. Paul. Extension Bulletin No. 52, published by the department of agriculture of the University of Minnesota. A valuable collection of house plans—the results of a prize contest in planning a model farm house.

Report of the Commissioner of Industrial and Vocational Education, California. For the year ending June 30, 1914. By Edwin R. Snyder. Published by the State Board of Education, Sacramento, California.

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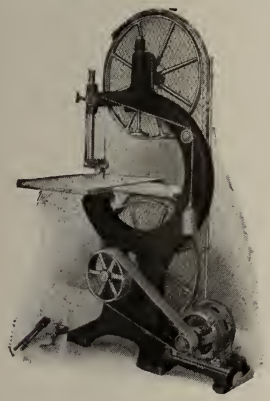

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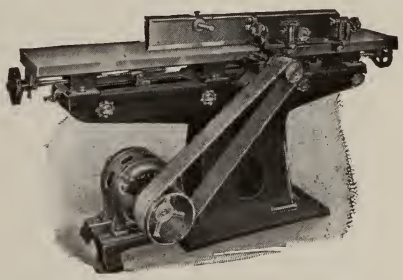

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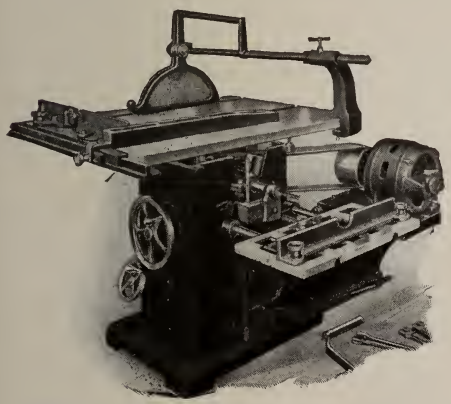

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FOREWORD

IN this number we present a discussion of commercial courses, a glimpse of what is being done in the way of manual training in one South American country and in our islands of the Pacific, and then three suggestive practical articles of interest to the shop teacher, one on inlaying, one showing a good problem for a class in carpentry, and the third showing school-made furniture that is not of the "carpenter type."

The writer of the first article, *John W. Curtis,* is principal of the Vocational Grammar and High School of Memphis, Tenn. After a rather comprehensive school experience in Texas, Mr. Curtis took the teachers' course in manual arts at Bradley Institute and then went to the Philippine Islands, where he was assigned to the Normal School at Cebu. On returning to the United States he became supervisor of manual training in Helena, Montana, and from there went to Memphis to organize the school of which he is now the principal. Some of our readers will recall his article in the December number 1913, excerpts from which were widely quoted.

The author of the second article, *Charles H. Magee,* is the assistant director of education for the Philippine Islands. His article is therefore an official statement concerning what has been called the most remarkable system of industrial education in the world at the present time.

Harold E. Everley, who writes on vocational work in Brazil, is a native of Illinois and a graduate of Bradley Institute. After two years of teaching he went to Teachers College, New York, for one year, and three years ago sailed for Brazil, where he has set a new standard in the organization and administration of shopwork courses for that country. His contract with the Brazilian government has expired and he will return to the United States this month.

The author of the fourth article, *Miss Ada Brownell Finley,* received her training at the Dekalb State Normal School in Illinois, the Sloyd Training School in Boston, and later took her B. S. degree at Teachers College, New York. For two years she was a member of the manual training staff in the city of Boston. During the past year she has been the editor's assistant in the work of this Magazine.

Harry L. Jones, who presents the simple problem in architectural drafting, is the supervisor of manual arts in Somerville, Mass., and teacher in the summer school at the University of Wisconsin.

Robert C. Craig is an instructor in the Manual Training High School of Indianapolis and this summer will teach at Bradley Institute.

This Magazine is kept for sale at McClurg's in Chicago, and Brentano's in New York.

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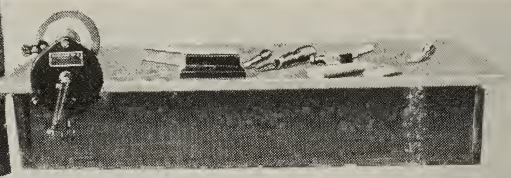
PETE SAYS: *"Give the Boys Carborundum Sharpening Stones"*



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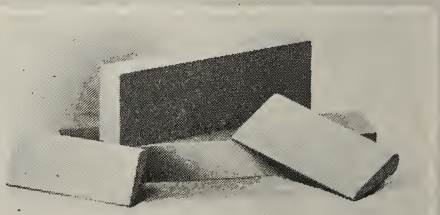

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MANUAL TRAINING AND VOCATIONAL EDUCATION FOR THE YEAR 1915-16

PRESENT indications point toward a marked development in this magazine during the school year 1915-16. The editorial staff expects to make Volume XVII more valuable in every way than any previous volume. The grounds for this expectation are,

I. The Editor has arranged to give a much larger proportion of his time and thought to the magazine. He will give up his administrative work at Bradley Polytechnic Institute, and will devote more of his time to editorial work and to writing.

II. The number of pages in the magazine will be increased, also the amount of space given to illustrations. This will make possible the expansion and enrichment of the "Of Current Interest" department and the addition of more illustrated articles. The "Shop Notes and Problems" department will share in this increase, and an attempt will be made to present a wider range of problems which have been found successful. The plan of using contributions from institutions having departments for the training teachers will be continued. At times special topics will be treated. For example, in the September number the department will be given over to notes and problems intended to improve the teaching and the shop equipment. Each number will have its aim to bring something worth while to some group of teachers.

III. Several articles are now in hand (most of them illustrated) and more will be ready soon which show what is being done by some of the most progressive men and women in the field to adjust their work to meet the new demands upon the schools—especially in the direction of vocational training and instruction in the art crafts. Some of the subjects treated will be: (a) the organization of a vocational school woodworking factory, (b) factory methods in the school shop, (c) the boy or the trade as an aim, (d) three methods of teaching the manual arts, (e) more art and skill in manual training and (f) preparing teachers for trade schools. An important series of articles is being planned on (g) the application of art to dress and needlework, and another on (h) woodwork design. There will also be articles on mechanical drawing, electrical work in a vocational school, printing, machine shop work, machine shop equipment, wood-carving, jewelry, inlaying, tile setting, etc.

With the promises of cooperation already received, there seems to be no doubt that the year 1915-16 will witness another important forward step by this magazine.—The Editor.

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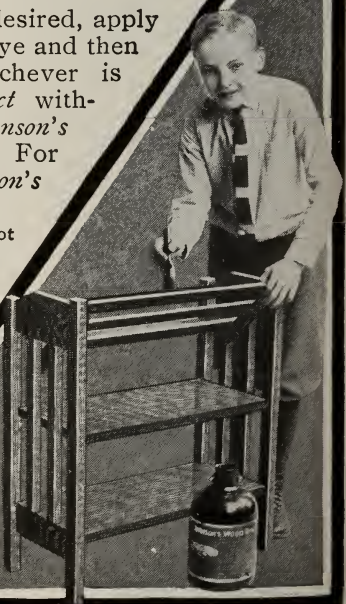

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FIELD NOTES

In the final announcement of the congresses, conferences, and conventions to meet in and near San Francisco during the exposition period, 129 meetings are scheduled. Most of these are part of the National Educational Association, or of the International Congress of Education, both of which meet in Oakland, August 16 to 28 inclusive. In addition there are several other meetings of special import—the Departmental Congress on Rural and Agricultural Education, Oakland, August 17, the Departmental Congress on Educational Investigation, Oakland, August 18, the Departmental Congress on Relationship between the School and Cooperative Organizations, Oakland, August 23, the Departmental Congress on Exceptional Children, Oakland, August 26, and the Departmental Congress on Vocational Education and Practical Arts, Oakland, August 27.

In order that those interested in some particular subject may attend, in one visit to the exposition, all the conventions that bear upon that subject, related conventions have been scheduled to follow each other in succession. These groups extend over a period of one to three weeks. This grouping plan is proving most sucessful.

A directory of the educational exhibits at the Panama-Pacific Exposition has been made as a means of conserving the time and energy of visitors to the exposition. In it are listed the different exhibits, together with their location, and a short description of their distinctive features. This directory, a small phamplet, will be amplified when all the educational exhibits are in place.

The war in Europe is making it impossible to carry forward plans for the International Art Congress, but the American Committee, headed by Royal B. Farnum of Albany, is cooperating with the San Francisco exposition authorities in perfecting plans for "Art Education Day" and the Congress on Vocational Education. The Committee is cooperating with the Western Drawing and Manual Training Association, the Eastern Arts Association, and the American Federation of Arts in organizing a party of teachers to attend the exposition in the month of August. This party will be under the business management of the Bureau of University Travel of Boston. It will leave Chicago, August 1st and go by way of the Canadian Pacific route. Stops will be made at Banff, Lake Louise, Kicking Horse Pass and many other points of interest. After the congresses some of the party will go to the San Diego exposition, and then return by way of the Grand Canyon. While headquarters are still in San Francisco, one day will be spent in a trip to the Muir Woods to see the forest of giant sequoias. Mr. Farnum will be the tour director. The Cooperating Committee from the other organizations consists of Miss Leila Mechlin, representing the American Feedration of Art, C. Valentine Kirby, representing the Eastern Arts Association, and Professor Frank M. Leavitt, representing the Western Drawing and Manual Training Association.

The constitution of the Vocational Education Association of the Middle West provides that the board of directors of that organization meet at least five times a year, these meetings to be open to all members of the association. The first meeting of the board was held at the Insurance Exchange Building in Chicago on Chicago on Saturday evening, May 8th. The new president, Prof. Frank M. Leavitt, was the chairman of the meeting. The first part of the evening was spent in listening to the report of the secretary, Albert G. Bauersfeld, and in discussing work which should be undertaken by the society. These were followed by an informal address on the policy of the National Bureau of Education with reference to industrial education by Dr. William T. Bawden of Washington.

An industrial summer high school will be opened in St. Paul at the end of the regular school term in June. The boys are to make 200 workbenches which will replace broken benches in the manual training rooms thruout the city. For this purpoes 8,000 feet of Wisconsin hard maple has been purchased. It is estimated by those who are to have charge of the work that twenty benches can be made from every 1,000

(*Continued on p. IX.*)

Mummert-Dixon Oilstone Grinders

ARE SPECIFIED FOR ALL THE LEADING SCHOOLS IN THE U. S. AS WELL AS FOREIGN COUNTRIES.

DO YOU KNOW WHY?

BECAUSE

THEY ARE THE BEST EDGE TOOL SHARPENING MACHINES IN THE WORLD. THEY ARE

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We are the originators of the Oilstone Grinding System.

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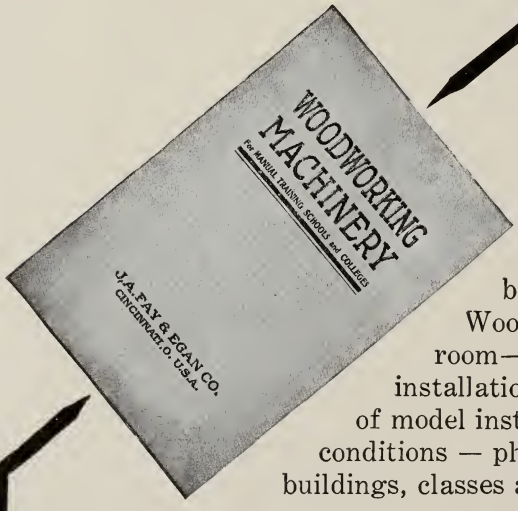

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handsomely bound in green and gold—profusely illustrated—just the right size for your desk or library—shows complete line of Woodworking Machines for the school room—many new models—electrical installation data—thirty blueprints of model installations to suit different conditions — photos of new school buildings, classes at work, etc.

If you now use, or intend to use

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in your school, you need this book—so fill in and mail coupon today and it will be sent to you free.

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feet of lumber. From the pieces of waste lumber the boys will make T-squares, cabinet-makers' clamps, and other shop appliances.

The work in this summer school will include forging, machine shop practice, cabinet-making, and wood-turning. There will be no academic work. In order to give the boys an insight into commercial methods of production, the work is to be done according to factory methods and on a strict business basis. Heretofore the school board has paid $10 a piece for manual training benches. It is estimated that these benches will cost from $4 to $6, thus saving a large sum on the total output.

Unfortunately it is necessary to limit the number of boys admitted to this summer industrial school to thirty-five. There are many more than this who are anxious to enter, but those who are responsible for the success of the undertaking feel it is wise to begin with a small group of boys.

According to the announcement from the State Normal School of Manual Arts and Home Economics, Santa Barbara, Calif., the school offers the following courses for men in manual and industrial arts; woodworking, elementary construction, working drawings, joinery, pattern making, turning, machine shop practice, forging, sheet metal work, plumbing, concrete work, house framing, mechanical drawing, printing, craft metal work, and other courses according to demand.

These courses are in continuous sessions, the terms beginning in June, September, November, January, and April. "At present there are no published courses of study since the development of individual instruction precludes stereotyped procedure. Succeeding years and changing educational policies in California leading toward higher standards permit a broad interpretation of the work which this state school is warranted to maintain."

In Paris, at the beginning of the war, many boys employed in "blind alley jobs" were thrown out of work. The mayor and others organized 1,400 of these boys into classes with competent instructors to teach them trades. As business conditions improved the majority of the boys went to work at any kind of a job that they could find, only about 450 remained to learn a trade. Most of these have been transformed from butcher boys, messenger boys, and small salaried clerks, into competent workmen in some well-paying trade or other, and several of them, —those especially talented, are becoming designers for glass windows and embroideries, wood-carvers, goldsmiths, and jewelers.

In Imperial, Calif., the old shop where the high school boys did their work had been inadequate for sometime, consequently a new one was built. It was begun late last October and was completed just after Christmas. To what extent the boys helped in the undertaking is interestingly told in a letter from their instructor, Joseph W. Paul, from which we quote the following:

"Outside of the actual construction of the building and the making of a few cabinets, all the extra work was done by the high school boys. They tore down the old building, taking out the forges, etc. In the new building they laid the blast tiles for the forges, placed the forges and machinery, put in concrete bases for the machinery, put up an 80 foot shaft line together with lining and leveling it, put up pulleys, laced belts, painted cabinets, did the electric wiring, laid outside drains, built a concrete sidewalk and constructed a concrete driveway that passes over irrigating ditches and a sidewalk.

"This work was all done after school hours and on Saturdays, except when the boys in the turning and forge classes helped for two weeks in their usual class time because the engine in their shop was not running, and when the boys in the woodworking class made a 25-foot workbench for the machine shop during their regular class time."

In East Orange, N. J., summer school work has been arranged for six weeks, five days a week, as follows: manual training, mechanical drawing, and cooking in the high school, and manual training in the grammar schools.

(*Continued on p. XI.*)

The Bemis Standard Benches and Vises

A RIGHT BENCH AT RIGHT PRICE. LOOK AT VISE

CATALOG WILL INTEREST YOU

72 COMMERCIAL STREET
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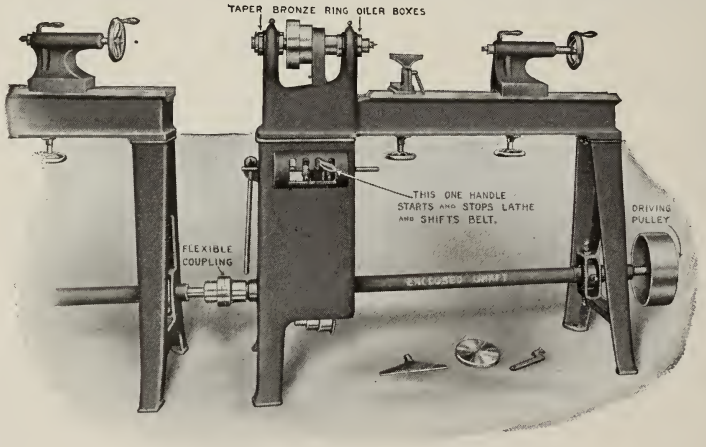
A. L. BEMIS

WELLS MANUAL TRAINING LATHES


TAPER BRONZE RING OILER BOXES
THIS ONE HANDLE STARTS AND STOPS LATHE AND SHIFTS BELT.
DRIVING PULLEY
FLEXIBLE COUPLING
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WELLS Shaft Underdrive Lathe with Single Handle Control

SAFETY AND SIMPLICITY—

That is what all supervisors and instructors want and must have in a Manual Training Lathe.

THE NEW "WELLS" LATHE with the SINGLE HANDLE CONTROL

has no equal in those and other essential features. We welcome investigation and comparison.

ONE HANDLE does it all—Starts the Lathe—Stops it—Changes the Speed. (4 changes). Could anything be simpler?

All Moving Parts carefully guarded. Cover also furnished over Upper Cone Pulley if desired. You don't need to worry about the boys getting hurt when operating "WELLS" Lathes.

Single Handle Control on both Shaft Underdrive and Motor Underdrive Lathes.

Demonstrator's Lathes with either Outside Face Plate, Tripod and Tee Rest or Hand Feed Carriage or both.

Every Manual Training Supervisor and Instructor should send for our New Free Circular.

F. E. WELLS & SON CO., GREENFIELD, MASS.

FIELD NOTES—(*Continued from p. IX.*)

Dr. Leonard P. Ayers and R. R. Lutz of the Russell Sage Foundation, New York City, have been making an educational survey of the schools of Cleveland. A committee of citizens act in an advisory capacity. It is because the people of Cleveland have proposed this method of attack on their school problems that the survey has been undertaken.

"What Occupation Shall I Choose?" is the name of a list of library books for girls and boys that will help them in answering this question. The list was compiled by the public library of Chicago and published by the committee on industrial education and vocational guidance of the Chicago Association of Commerce working in cooperation with the board of education. The listed books, forty-five in all, are divided into four general groups under the following headings; Men and Women Who Have Made Good, How to Succeed, Vocations for Boys, and Vocations for Girls.

"The teaching of Art and Industrial Work in German Schools" is the subject of a report that will shortly be issued by the school authorities of New York City. This report was made about two years ago by Dr. James P. Haney, director of art in high schools, who was given a five months' leave of absence to study the industrial art teaching of Germany and Austro-Hungary. Coming at this time, the report has especial interest when many of the art schools which it describes have had their work partially or wholly interrupted by the war.

The Philadelphia Trade Schools turned away this year nearly 1,000 men on account of insufficient accommodations, in spite of the fact that classes were in session six nights a week instead of three, as has heretofore been the custom. Fifty men will be graduated this term, all of them, men that are employed thru the day.

The Franklin Union Industrial School, Boston, has an attendance this year of 1351 pupils. This is a considerable increase since September, 1908, when the school opened with a registration of 533 pupils. It is interesting to note how the students are distributed in the different classes, particularly in the larger classes; 310 are studying industrial electricity, 302 are studying gas engines, 160 are studying steam engines, 120 civil engineering, and 112 industrial chemistry.

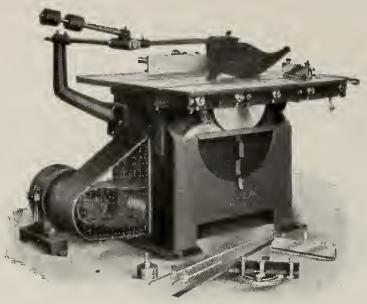
Many different employers are represented by these students; for instance, 21 employers have 3 students each, 101 employers 2 each, the New England Telephone and Telegraph Company 41, the United States Government 35, the city of Boston 23, the Edison Illuminating Company 22, the Fore River Shipbuilding Corporation 21, the Boston Elevated Railway 20, and the New Haven Railroad 17. Most of those students coming from the Fore River Shipbuilding Corporation, together with some from the Charleston Navy Yard, are enrolled in a course in naval architecture. This is a new course this year. The school has been prepared to give this course since 1908, but this is the first year there has been any demand for it.

The millinery class in the Girls' Vocational School, Minneapolis, trimmed, during the rush season this Spring, seventy-five hats in three weeks time. These had been ordered by the teachers and pupils of the school. The dressmaking class also was busy, for it filled orders amounting to more than $100. The sewing is taught by Miss Mary Wright and Miss Leila Gerry.

All the money making is not done by the girls in the sewing classes, as the girls in the cooking classes, under the direction of Miss Maude Carpenter, do their share. One group of girls has charge of the school lunch room, and another does catering, taking orders for all kinds of delicacies, or for the making and serving of refreshments for parties, either at the school or in private homes.

Under the auspices of the Chamber of Commerce of Cincinnatti an educational survey is to be made of every industry in the city. Mr. Condon, superintendent of the Cincinnati schools, says of the survey of the printing trades, which has just been completed, that it is a splendid piece of constructive educational work. Miss Cleo Murtland, assistant secretary in charge of the women's work of the National Society for the Promotion of Industrial Education, has been engaged to make the survey for the sewing trades.

OVER 800 SCHOOLS USE OLIVER TOOLS



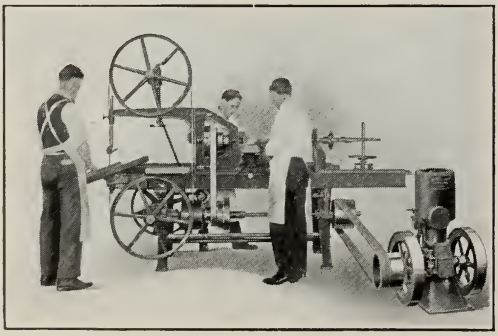
QUALITY

Over 3000 Oliver Speed Lathes Used in Schools
Over 500 Oliver Grinders Used in Schools
Over 400 Oliver Saw Benches Used in Schools
Over 400 Oliver Band Saws Used in Schools
Over 800 Oliver Forges Used in Schools

Write for the new Oliver Manual Training Bulletin just out.

OLIVER MACHINERY CO. **GRAND RAPIDS, MICH.**

"Buffalo" Crain Combination Woodworker



Only one belt to operate your entire woodshop equipment. Why not reduce your belt and shafting expenses, diminish your waste floor space and concentrate your instruction.

The "Buffalo" Crain Combination Woodworker combines:—Band saw, rip saw, cross-cut saw, planer, jointer, shaper, edgemoulder, lathe, drill, borer, spoke equalizer and tenoner.

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Manufacturers: Forges, Drills, Engines, Heating and Ventilating Apparatus.
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TRADE NOTES

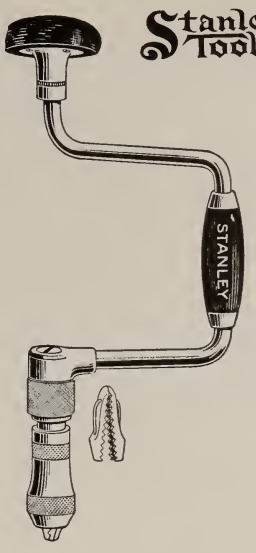
A REMARKABLE CATALOG OF TOOLS AND HARDWARE

We have just received from Hammacher, Schlemmer & Co. of New York City the most convenient and extensive catalog of "Hardware Tools and Supplies" that has ever come to our desk. It contains 1142 pages 9"x12" in size. It is essentially the same size as one of the volumes of the Century Dictionary. It represents "the boiled down essence of the literature of 1,000 manufacturers," plus descriptions of goods manufactured for or exclusively controlled by Hammacher, Schlemmer & So. In clearness, typography, and comprehensiveness—all three, this catalog excells.

The first 22 pages are devoted to an introduction printed on plate paper. Here we find the portraits of the officers: William Schlemmer, who is at present the treasurer of the company, has been identified with the business for 61 years continuously, and was president and treasurer up to 1914; William F. Schlemmer, identified with the business for the past 23 years, 15 years as vice-president and now president; and Dean Park, connected with the business for 18 years, and secretary for 10 years. Then follow pictures of their present store at 127 to 133 Fourth Ave., corner of 13th St. These show the exterior, the offices, the packing and shipping department, storage rooms, general views of the sales rooms, the show windows, etc. Interspersed with these photographs are many attractive pencil sketches suggesting different phases of the business.

We understand that copies of this catalog cost nearly $4 each and therefore are not given out indiscriminately, but we assume that directors of the manual arts who are connected with prominent institutions and are in a position to influence a favorable amount of buying can probably get copies without much trouble. Obviously such a catalog cannot be sent to every teacher who might want a copy, but it is surely something to be desired. It is a cyclopaedia of shop conveniences and supplies. Someday perhaps school boards will purchase such catalogs for educational purposes. If accessible to a boy of workshop age it would be read about fifty times as often as the school copy of the Encyclopedia Britannica.

(*Continued on p. XV.*)



STANLEY CONCEALED RATCHET BIT BRACE

The novel features of design, together with the high quality of workmanship and material, place this tool in a class by itself as to strength, durability and convenience of operation.

The Cam Ring, which governs the Ratchet, is in line with the Bit—a great advantage in working. It also serves as a cover or case for the Ratchet mechanism, protecting it from dirt, grit and moisture, and enabling oil for lubrication to be retained for a long time.

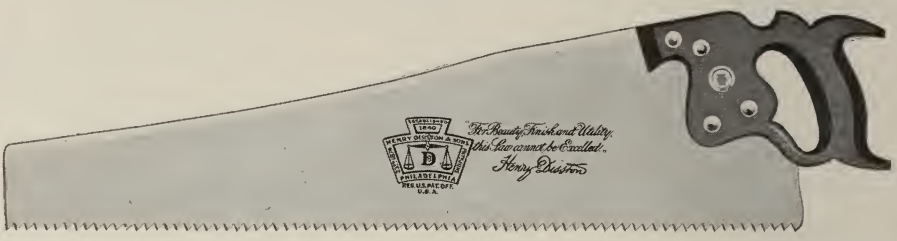
This form of construction presents a neat appearance as well as guarding the user's hands perfectly.

For the reasons stated this makes an ideal Brace for Manual Training use.

STANLEY RULE & LEVEL CO.
NEW BRITAIN, CONN. U.S.A.

The tools of the mechanic are the tools for the student

Keep him enthused with the satisfaction of successful work by giving him the right tools to do it with.



DISSTON SAWS and TOOLS

have been the choice of skilled mechanics for three-quarters of a century

Consult our Educational Dept. on your Manual Training requirements.

Henry Disston & Sons, Inc., Philadelphia, U.S.A.

TO TEACHERS OF MANUAL TRAINING CHAIRMEN OF SCHOOL COMMITTEES AND SUPERINTENDENTS OF SCHOOLS

We know what are the best carpentry tools and the best equipment for a manual training department. Why you should have a manual training department and what tools the boys need in their carpentering work are fully explained in our booklet, "The Professor and the Saw," which will be of value not only to boys but to teachers and heads of school boards everywhere. It also tells about

SIMONDS SAWS

Let us send you a copy.

"If you want saws that cut like diamonds,
Ask for saws that are branded SIMONDS."

If your dealer can't supply you, we will. Send for our booklet 3, "The Professor and the Saw."

SIMONDS MANUFACTURING CO.

"The Saw Makers" FITCHBURG, MASS. 5 Factories—11 Branches

TRADE NOTES

(*Continued from p. XIII.*)

More and more are manufacturers and dealers appreciating the value of a personal acquaintance among those who specify equipment and supplies. At the meeting of the Western Drawing and Manual Training Association, held at the Art Institute, Chicago, from May 5 to 9, the whole range of commercial exhibits was represented, with profit to both exhibitors and visitors.

MACHINERY AND TOOLS

The American Wood Working Machinery Company, represented by F. J. Oberlander, George Whitney and Homer Cutter, all of Chicago, showed their No. 20 Universal Saw Bench, No. 14 Universal Grinder and No. 1 Bench Jointer with its round safety type of cylinder. Beautifully illustrated circulars of these machines were distributed.

E. A. Cherry was in charge of the Stanley Rule & Level Company exhibit. This firm is well known as the manufacturers of the famous "Bailey" and "Bed Rock" planes. Sectional views of planes was an interesting feature of the exhibit. A photograph of tools dug from Pompeii attracted attention, because it establishes the fact that planes of a crude form were used even in that day.

Orr & Lockett Hardware Company had a complete line of manual training tools, a domestic science table and a manual training bench. A feature of their bench tops is the fact that they are made with dovetail joints, thus preventing the possibility of loosening. This firm also has the agency for the well-known Wells' Underdrive Lathe, in the middle west. R. S. Thompson was in charge of the exhibit.

Many of the manual training teachers were glad to make the acquaintance of the W. A. Ives Mfg. Company of Wallingford, Connecticut, through their representative C. S. Thomas. They manufacture the "Mephisto" bits, chisels and braces. In their exhibit, emphasis was given to their "Mephisto" bit by means of demonstration.

(*Continued on p. XIX.*)

J. BERNARD CO.

422-30 East 53rd St., NEW YORK

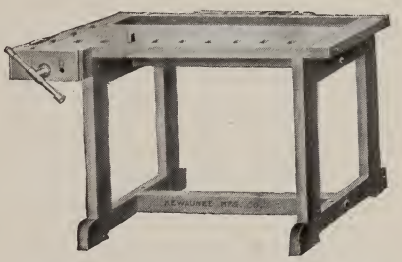
Marquetry, Borders,
Lines and Fancy Metal Work.
Scroll and Jig Sawing.

Marquetry Designs for
Suites, Trays, Cabinets,
Chairs, Ship Panels,
Pianos, Mantels, Clocks,
Cars, Drawing-Rooms
and Boudoir Interiors.
Period Designs
Correctly Executed.

Choice
Unique Borders and
Choice Veneers in
great variety and Colors.

Satinwood, Holly, Black,
Box, Celluloid, Brass
and Copper Lines.

KEWAUNEE BENCHES



This bench is particularly designed for schools where a moderate equipment is desired, but where drawer sections are not required. This is a simple serviceable bench.

We are manufacturers of Laboratory Equipment for all School Work. If interested, just ask for Catalog J.

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS
KEWAUNEE, WIS.

The 14" x 6' Standard Single Back Gear
MONARCH LATHE
Is regularly equipped with countershaft and all necessary equipment including compound rest.

You should know the merits and the low price of this Lathe. It offers the greatest Lathe Value on the market

MONARCH LATHES

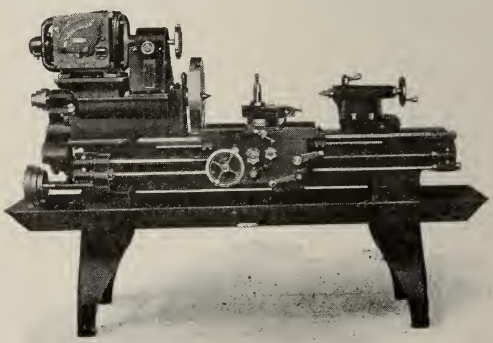
ARE IN GREATER DEMAND for the Vocational School than ever before. Many Schools using MONARCH lathes in the past are sending re-orders for additional MONARCH lathe equipment.

We have made a special study of the requirements of trade schools and offer MONARCH LATHES in the various sizes to fill any requirements at exceedingly low prices.

MONARCH LATHES are built in 14, 16, 18 and 20-inch sizes and can be furnished with any of the following attachments.

Single back gears.
Double back gears.
Standard or loose change gears.
Instantaneous quick change gears.
Taper attachment.
Cabinet legs.
Draw-in chuck and all sizes of collets.
Chuck plate flanges threaded to fit spindles.
Thread chasing dial.
Thread chasing stop.
Automatic feed stop for feed rod.
Turrets on carriage or shears.
Steel bed pan with or without oil pump or reservoir,
Raising blocks to increase swing.
Milling and gear cutting attachments.
Direct connected variable speed motor drive.
Direct connected constant speed A. C. or D. C. motor drive through all geared headstock.
Single pulley drive through all geared headstock

Write today for Catalog and Prices and list of Trade Schools using Monarch Lathes.



The 14" x 6' MONARCH Motor Driven Lathe with bed pan. Either constant speed or variable speed motor can be used.

THE MONARCH MACHINE CO.

SIDNEY, OHIO, U. S. A.

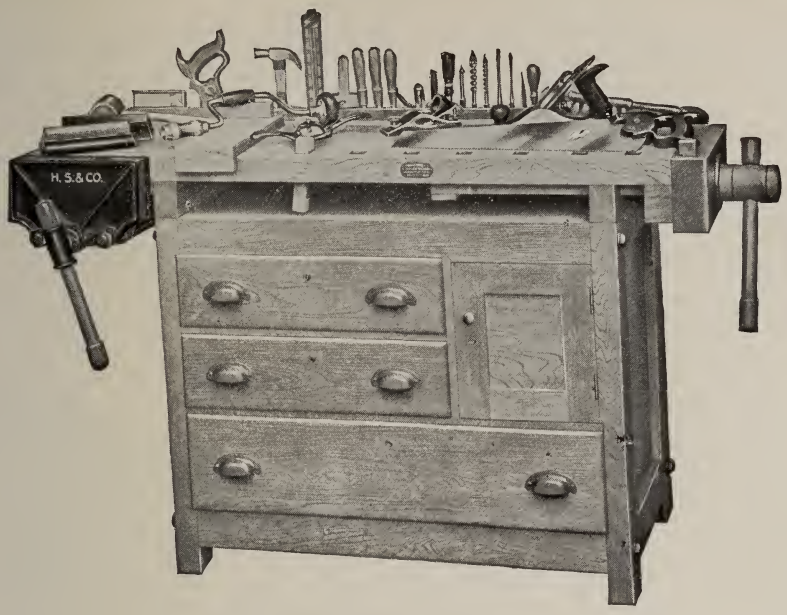


Illustration of our New No. 25A Outfit

TOOLS AND BENCHES

FOR

MANUAL TRAINING

For years we have studied the requirements of schools and the experience gained proves that the *best* Tools and Benches are the cheapest in the long run. They are more uniform in quality, last longer, give better results and in every way are preferable. Our hobby *since 1848* has been QUALITY and we aim to carry *only the best.*

To directors and instructors and all those who are interested in Manual Training we will send our Tool Catalog No. 3219.

HAMMACHER, SCHLEMMER & CO.

HARDWARE, TOOLS AND SUPPLIES

4th Ave. and 13th St. NEW YORK, SINCE 1848

The Ideal Mitre Box For Shop Practice

The trained expert of the future is the well-taught boy of today. What better tools could he use than those of Millers Falls durability and reliability?

This Millers Falls Mitre Box, for instance, has time-saving, accuracy-inspiring features that make it especially adapted to shop practice. It teaches accuracy in angle sawing by being accurate itself. Quickly and easily adjusted to any angle and to any depth of cut. Saw supports may be instantly locked at either a positive or an intermediate angle. And these are not all the improved, service-giving features of this

MILLERS FALLS
LANGDON
ACME MITRE BOX
IMPROVED

Graduated arc and index plate show where to set the saw for any cut. Gauges are provided for setting saw to stop at any depth desired. Length gauge provides for sawing duplicate lengths with one adjustment. Simple automatic device holds the saw guides when raised to highest point and releases instantly. Slotted support is always immediately beneath the saw and holds the work to prevent splintering at end of cut.

Ask your dealer to show you this Mitre Box, and other new Millers Falls tools—notably Millers Falls Bit Brace 872 and Hand Drill 306—which will aid you in your work. Send for pocket catalog describing complete line.

MILLERS FALLS TOOLS

MILLERS FALLS CO., MILLERS FALLS, MASS.
28 Warren St., New York

Our exhibit at the Panama-Pacific Exposition is in Block D, Row 20, Manufacturers Building. Don't fail to visit it while at the fair.

TRADE NOTES

(*Continued from p. XV.*)

Henry Disston & Sons were represented by E. C. Schiele, who has charge of their educational department. Through Mr. Schiele this progressive firm is making a personal acquaintance with the school trade of this country. In their exhibit special attention was called to their No. 69 Dovetail Saw, used to cut sheets and tubes of copper and brass, and their No. 10 Coping Saw, which has recently been improved by the elimination of the adjusting pins and the addition of a locking nut.

The printing equipment people were represented by E. A. Homan for Barnhart Bros. & Spindler, and by Franklin Wanner for the Wanner Machinery Company. The latter firm had a Chandler & Price press running, on which they were printing a small circular descriptive of these presses. They also showed an Advance paper cutter. The rapid development of printing in the schools is opening a market for equipment that is well worth cultivating.

Simonds Mfg. Company, represented by R. D. Baldwin and R. A. Shaffer, had quite a full line of saws, including hack-saw blades for machine shop work and files for hand saws. The progressive steps in making a hand saw blade and handle were shown. They distributed an interesting little booklet entitled "The Professor and the Saw," which illustrated one of the saw problems of the woodworking teacher.

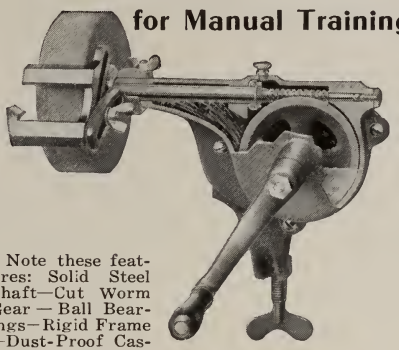
The James Clark Jr. Electric Company exhibit covered a number of machines, including a combination wet and dry grinder, power hack saw, bench grinder, sensitive drill, lathe center grinder, and jeweler's drill—all motor driven. The jeweler's drill is a new tool for craft workers which can be operated from an ordinary lamp socket. The exhibit showed the application of motors to machine tools, with both motor and tool made in one factory. Oscar P. Wodack, manager of the Chicago office, was in charge.

The exhibit of North Bros. Mfg. Company was in charge of F. A. Mutchmore of Philadelphia. They showed quite a complete line of "Yankee" breast drills and hand drills, in both ratchet and

(*Continued on p. XXI.*)

LUTHER "Best Maide"

The Ideal Tool Grinder for Manual Training



Note these features: Solid Steel Shaft—Cut Worm Gear — Ball Bearings—Rigid Frame —Dust-Proof Casing. Grinding Wheel can be tilted to run at any angle and in any plane. Speedy — Light Running — Vibrationless.

Tools are both ground down and finished on the same wheel. With the fine grit side face you can put on a fine, keen edge without using an oil stone.

Luther Tool Grinders are always reliable. Made by the oldest and largest manufacturers of Tool Grinders of America. Sold by dealers everywhere. Write for booklet.

LUTHER GRINDER MFG. CO.
450 Point Street Milwaukee, Wis.

UNIVERSITY OF WISCONSIN

SUMMER SESSION, 1915

COURSES IN

PUBLIC SCHOOL DRAWING, DESIGN, MECHANICAL DRAWING, ARCHITECTURAL DRAWING, ART METAL WORK, WOODWORK, PATTERN MAKING, BUILDING CONSTRUCTION, FOUNDRY, FORGE PRACTICE, MACHINE SHOP WORK, ETC.

ALL BRANCHES OF THE MANUAL ARTS AND HOME ECONOMICS FOR HIGH SCHOOL TEACHERS. COURSES IN TEACHING AND SUPERVISION AND ORGANIZATION OF THE MANUAL ARTS.

The University offers 346 courses for those who wish to do regular graduate or undergraduate work with credit toward any degree in Letters and Science, Engineering, Law, or Agriculture.

6 WEEKS—JUNE 21 to JULY 30
LAW, 10 WEEKS—JUNE 21 to AUGUST 27

One fee for all courses, $15, excepting Law, $25.

Write for Illustrated Summer Session Bulletin.

REGISTRAR, UNIVERSITY, MADISON, WIS.

What New Equipment Does Your School Need?

As soon as school closes you will look over the shop equipment of your school. You will find that you need to provide for more boys and to replace out-of-date tools and benches with more modern equipment. We want you to remember that

Starrett Tools

are the finest Instruments of Precision made—the accepted standard in most big plants. If your boys learn to work with Starrett Tools they will learn to respect and work for accuracy.

There are Starrett Tools for all fine measuring operations. The line includes steel rules, squares, bevels, protractors, combination sets, micrometers, calipers, dividers, hack saws, and other tools with which the boy should be perfectly familiar.

Our new free 320-page catalog No. 20EF shows 2100 styles and sizes. Write for your copy to help make selections for your fall purchases.

BY INVITATION MEMBER OF

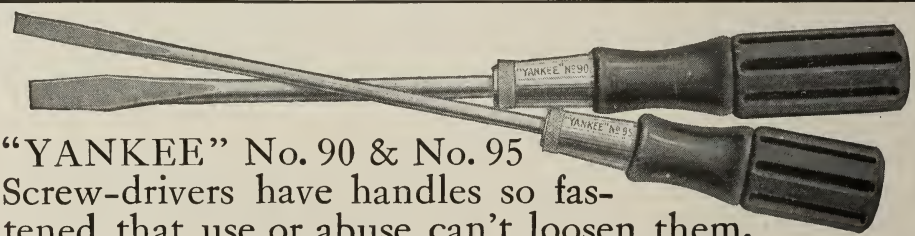
NEW YORK U.S.A.

The L. S. Starrett Company

World's Greatest Tool Makers

Athol, Mass.

42-346

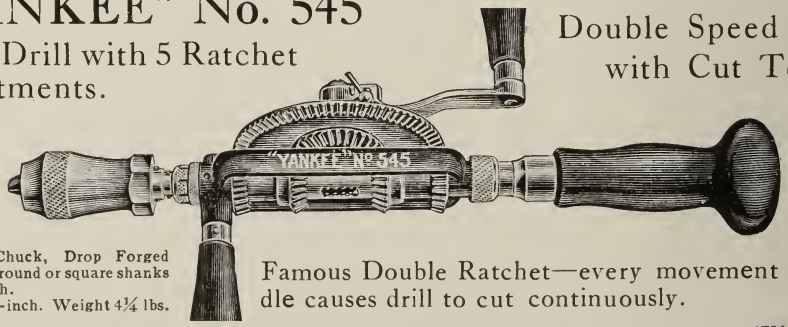


"YANKEE" No. 90 & No. 95
Screw-drivers have handles so fastened that use or abuse can't loosen them.
If you want that kind, look for the **"YANKEE"** brand.

No. 90—Standard; 14 sizes, 2-in. to 30-in. blades. No. 95—Cabinet; 11 sizes, 2½-in. to 15½-in. blades.

"YANKEE" No. 545
Hand Drill with 5 Ratchet Adjustments.

Double Speed Gears with Cut Teeth



Two-jaw Chuck, Drop Forged Steel, holds round or square shanks up to ⅜-inch.
Length 16½-inch. Weight 4¼ lbs.

Famous Double Ratchet—every movement of handle causes drill to cut continuously.

"YANKEE" TOOLS
Make Better Mechanics

Your dealer can supply you. Look for "YANKEE"

Write us for "'Yankee' Tool Book" for mechanics and amateurs; "'Yankee' Tools in the Garage" for motorists

NORTH BROS. MFG. CO., Philadelphia

TRADE NOTES

(*Continued from p. XIX.*)

plain drills, and also ratchet tap wrenches, screwdrivers and braces. A special feature of their exhibit was their new "Yankee" Vise No. 1993, which is the same pattern as their No. 990, but larger and having a swivel base and loose jaw. These features make it unique, and manual training teachers will be interested in investigating its merits.

E. H. Sheldon & Company were represented by George Horner, their Chicago manager. They showed a domestic science table, drawing table and manual training bench. The firm has recently added to their line laboratory tables for cooking, sewing, physics, biology, and chemistry. Their catalog No. 15 describes all these tables, and is one of the most attractive catalogs we have seen recently.

One of the new firms exhibiting was The Surty Guard Company of Chicago. This firm manufactures guards for jointers, saws, shapers, band-saws and emery wheels in addition to other safety devices. Their guards are said to meet with the approval of industrial insurance companies and will therefore merit investigation in this age where "Safety First" is being urged on all sides.

Another new exhibitor was the Luther Grinder Company of Milwaukee, represented by George Nixon. This firm manufactures a large variety of grinders for different uses, their "Best Maide" Grinders Nos. 51, 52 and 53 being very popular among carpenters, mechanics and cabinet makers. The two special features of construction of this type of grinder are its worm gearing and the tilting frame. These machines run in oil, which automatically lubricates every part of the machine. They issue a very complete catalog of their machines which fully illustrates all the special features.

The Adjustable Clamp Company represented by M. W. Russ had an exhibit of the "Jorgensen" adjustable hand screws in a number of sizes. The distinguishing feature of this clamp is the steel spindle which prevents the cramping of the spindle and the jaw, thus adding to the life of the tool.

(*Continued on p. XXIII.*)

If you need Manual Training Benches, Domestic Science Tables or Drawing Tables,

WHY NOT GET THE BEST?

There is a great difference in the manufacture of these articles, altho, to the casual observer, they are all built alike. We specialize in the manufacture of Manual Training Benches, Domestic Science and Drawing Tables, and as we have studied your requirements for years, we are to-day making the most modern and practical benches and tables that can be bought.
Write to-day for our illustrated catalog and circulars concerning school equipment.

C. CHRISTIANSEN
MANUFACTURER
2219 Grand Ave. CHICAGO, ILL.

GEMS

Sent on Approval to Jewelry Craft Workers and Schools and Colleges

ESPOSITER VARNI Co NEW YORK

You may send to us for a collection of gems. After selecting those you want, return the remainder. When writing for gems give us full information of your requirements and furnish us a reference.

SPECIAL

We have secured a large lot of fine

MOONSTONES

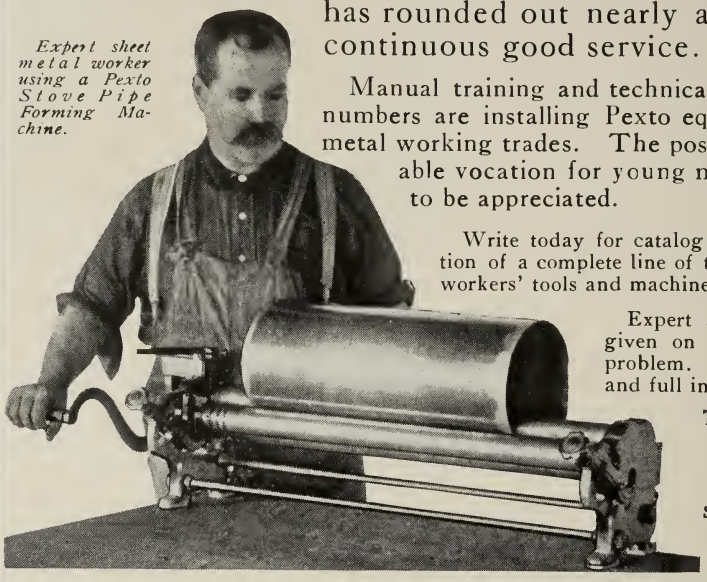
This is the birthstone for June.

ESPOSITER, VARNI CO.
Gem Dealers and Cutters
49 John St. Dept. A New York

PEXTO

In Use Since 1867

Out in Sallisaw, Okla., is a set of Pexto machines owned by Chas. Dunham, which has rounded out nearly a half century of continuous good service.



Expert sheet metal worker using a Pexto Stove Pipe Forming Machine.

Manual training and technical schools in increasing numbers are installing Pexto equipment for the sheet metal working trades. The possibilities of this profitable vocation for young men are just beginning to be appreciated.

Write today for catalog 13-A with a full description of a complete line of tinsmiths' and sheet metal workers' tools and machines.

Expert advice will cheerfully be given on any sheet metal working problem. Just send us specifications and full information.

The Peck, Stow & Wilcox Co.
Mfrs. Mechanics' Hand Tools
Tinsmiths' and Sheet Metal
Workers' Tools and Machines,
Builders' and General Hardware.

Southington, Conn. Cleveland, O.

Address correspondence
206 W. Center St.
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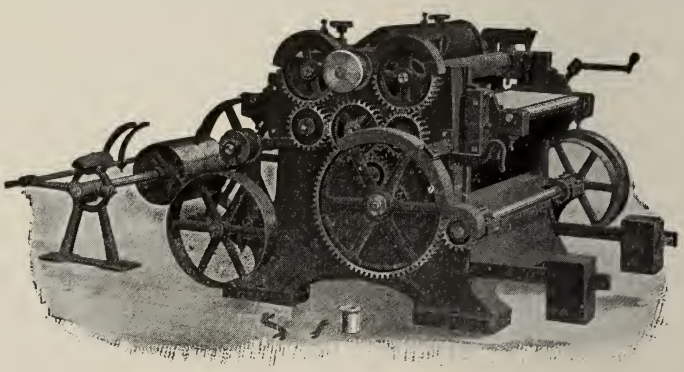
Give Your Students an Opportunity to Use Practical Woodworking Machines



CRESCENT

machines are used in the most progressive factories where speed, accuracy and durability are considered prime requisites of the equipment. When your students go out to take places in factories, they will be impressed by the durable features of the **CRESCENT** machines, so you may as well allow them to become familiar with the machines now.

Send today for complete catalog telling about our splendid line of Band-Saws, Saw-Tables, Jointers, Shapers, Planers, Planers and Matchers, Borers, Disk Grinders, Variety Woodworkers.

THE CRESCENT MACHINE CO.

No. 46 Cherry St. **Leetonia, Ohio**

TRADE NOTES

(*Continued from p. XXI.*)

For lack of space several firms who regularly exhibit were unable to have a display. George Fortier and G. F. Reinhard representing the Grand Rapids Hand Screw Company, and J. C. Whitney, M. D. Baldwin, A. S. Kurkjeian and T. S. Peirs, representing the Oliver Machinery Company, were in attendance renewing their old acquaintances and making new ones. Both of these firms are well known to the manual training people.

DRAWING INSTRUMENTS AND SUPPLIES

The demand for the best in drawing instruments is insistent and consequently each firm's goods are subject to careful examination. This department of school equipment was well represented by several firms.

Eugene Dietzgen Company had a very complete exhibit of their regular line of drawing instruments and tables. Special features of their exhibit were their green celluloid triangles which make it easier to work by artificial light, and a new Tee-square with wider blade made of heavier material, which thus lessens the possibility of warping. W. O. Phillips was in charge.

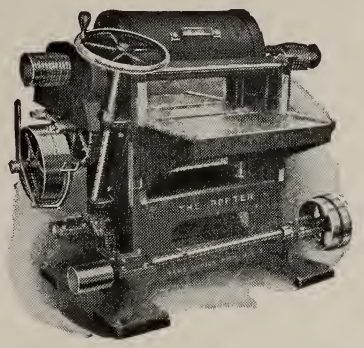
The well-known line of Richter drawing instruments was shown in the exhibit of the United States Blue Print Company, in charge of W. W. Koch. This firm emphasizes their waterproof drawing ink and Nigra pencils in all their exhibits.

The Frederick Post Company had an excellent exhibit of drafting equipment and inks along with various print papers. Fred Bishop, whose association with this firm is so well known, was in charge.

The firm of Keuffel & Esser were represented by H. B. Huster and W. A. Keuffel. Anything in the line of drafting room furniture and equipment can be purchased of them, in addition to drawing tables and instruments for regular

(*Continued on p. XXV.*)

"The Porter" Single Surfacer



Made in 20″ and 24″ sizes. Well, safe guarded, a strong, well built machine that will do probably all and more work than you have and sells for from $135.00 and up.

We are willing to send you the machine on 30 days trial and if you are not convinced that it is a big bargain for the money, you may return it at our expense.

C. O. Porter Mach. Co.
Grand Rapids, Mich.

A New Stimulus for Class Work in Glass Work

Cash Prizes $10.00 to $1.00

Manual Educators have long held that work in glass does not receive the attention it deserves. As makers of the standard glazier's tool,

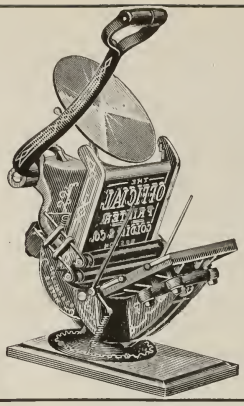
"RED DEVIL" Glass Cutters

we feel it almost a public duty to further the possibilities of "glass craft", and therefore offer cash prizes for work done in this material.

The contest is open to boys of 17 or under. It will stimulate them to exert their intelligence and inventiveness, to make a showing of which their teacher, their parents and they themselves can be proud.

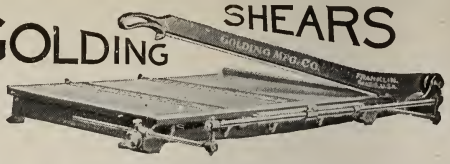
Contest closes May 31st. So write **now** for full particulars and enrollment blank, which will be sent with a No. 024 "RED DEVIL" glass cutter for 10c. Write today.

SMITH & HEMENWAY CO., Inc.
155-157 Chambers St., New York



The OFFICIAL HAND PRESS

GOLDING SHEARS



simplifies and increases the possibilities in manual training work. The press is strong, simple, easily and quickly operated. Is practical for all kinds of work. The smallest schoolboy can operate it. Prices $16 to $60.

OTHER PRESSES. We manufacture also a complete line of foot treadle and power presses with extra efficiency features. Prices $80 to $600.

CUTTERS. Our extensive line of cutters and shears enables us to serve every requirement for cutting of paper, cardboard, leather, cloth, and wood veneer. Price $4 to $600.

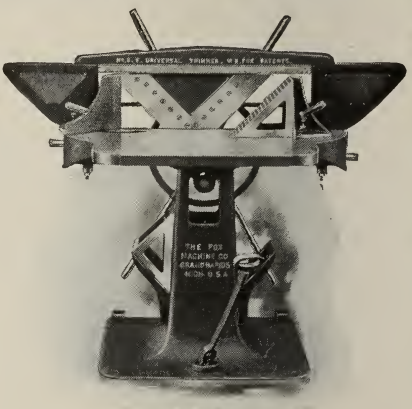
Request Catalogue. State Requirements.

GOLDING MFG. CO. **FRANKLIN, MASS.**

FOX

"Universal Trimmers"

TRADE MARK



6 F. "Universal Trimmer"
TRADE MARK

THEORY:

Every Manual Training Instructor knows how hard it is to show the boys the application of mathematics to actual work.

PRACTICE:

The Type "F" Fox Trimmer fills the breach. We not only build a machine to trim any angle perfectly, but also have designed the machine so that the mathematical connection is readily apparent to scholars.

Write Today for Descriptive Literature of this Practical Aid to Instructors.

FOX **MACHINE CO.** 647 Front Ave., N. W. GRAND RAPIDS, MICHIGAN

Students Using Dietzgen Instruments

—the proper aids for correct drawings—
are well prepared for accurate work

Eugene Dietzgen Co.

MANUFACTURERS

Chicago New York San Francisco New Orleans
Toronto Pittsburg Philadelphia

TRADE NOTES

(*Continued from p. XXIII.*)

school use. They have recently brought out a slide rule which is unique. In its various forms, it serves contractors, builders, architects, engineers and surveyors according to their respective needs. It is of use to anyone who has to make a great variety of intricate and extended calculations, including merchants, accountants, importers and exporters.

ART MATERIALS

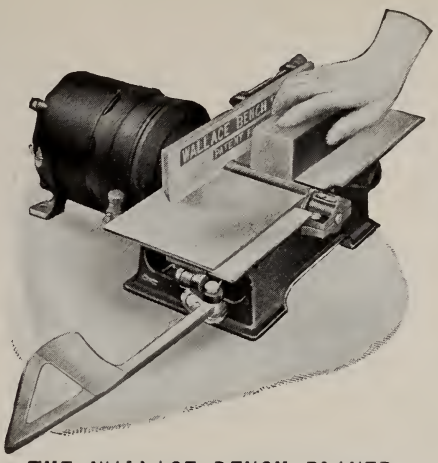
The various mediums used in art work were exhibited by a number of well-known firms, and along with them were examples illustrating the character of work which could be done with each medium.

The Prang Company exhibit was interesting because of the addition of several novelties to their line. Their arts and crafts beads of wood stained to simulate the various kinds of beads was interesting, as was also their Enamelac, which is used for decorating wood, metal and papier mache models. It is, of course, as dealers in water color paints that they are best known, and they showed a full line of tempera water colors, illustrating the whole gamut of decorative art. There was present, Edwin O. Grover, the president, Jesse E. McElhaney, S. R. Keates, Jennie L. De Muth, and E. B. Heiny.

Another firm that one always expects to find represented is The American Crayon Company. W. G. Youse and E. L. Curtis were in charge of their exhibit, which consisted for the most part of drawings gathered from all over the United States illustrating the use of their Pastello and Crayograph.

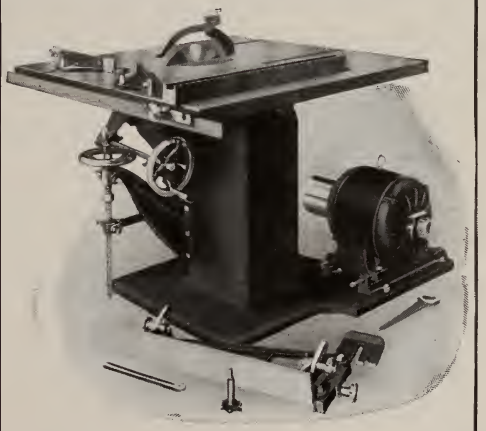
For the past year Favor, Ruhl & Company have been introducing the Arnold water color paper to replace Whatman's, and it is proving all they claim for it. This firm is best known perhaps through the Munsell Color System which they have been introducing for several years and the Wadsworth Howland school water colors. They had in their exhibit the Bissell opaque water colors in liquid form for poster work, and the Gee-Wee tempera colors manufactured by

(*Continued on p. XXVII.*)



THE WALLACE BENCH PLANER
WITH FLAP AND SHUTTER GUARD
Can be used with PERFECT SAFETY
by students as well as teachers
IT IS THE ULTIMATE
SCHOOL PLANER
J. D. WALLACE
529 W. VAN BUREN ST., CHICAGO, ILL.

WE HAVE QUITE A COMPLETE LINE OF
SAW TABLES



Our No. 4 tilting table, with or without motor drive, is up-to-date for manual training. First class in every respect.
Write us.

ALEXANDER DODDS COMPANY
451-453 Monroe Ave., N. W.
Grand Rapids, Mich.

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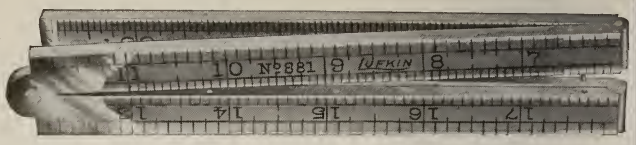
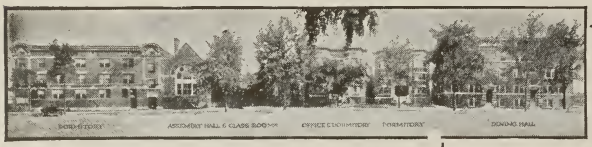


BOXWOOD RULES No 702 (Old No. 18) No. 761 (Old No. 63) No. 808 and No. 881 (Old No. 5) (Old No. 54)

are strictly high grade and specially adapted to manual training work. Ask for them when in the market. We guarantee you satisfaction. We also make spring joint wood rules and No. 60 and No. 62 straight steel rules for school use. Send for Catalogue.

THE LUFKIN RULE CO. SAGINAW, MICH. NEW YORK



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Teach Manual Training

Special One-Year Course in Manual Training and Drawing. Also courses in Domestic Science, Domestic Art, Music, Physical Training, Industrial Arts. *Only* school in the country devoted exclusively to equipping young men and women to teach these in public schools. 24th year Also two-year course. Strong faculty, beautiful location, unsurpassed equipment, dormitory. Catalogue free. Address

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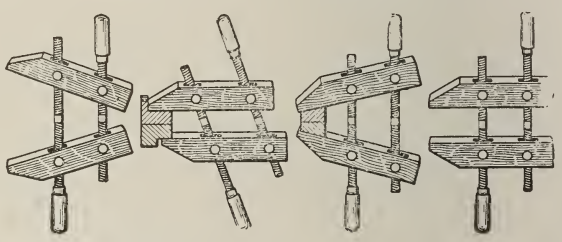
The Manual Training Student

should be taught with the tools he will eventually use in after life.

The Jorgensen Adjustable Handscrew is superseding all other makes in the factories. We can prove that. If it is the cheapest and best for the factory, why not for the Manual Training School? Write for circular and prices.



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Send for catalog of books and 9x12 prints

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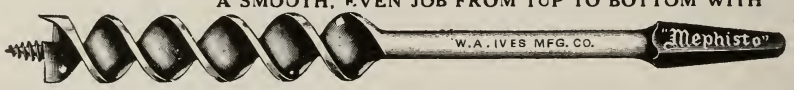
DEPT. E, - - - - - - - DALLAS, TEXAS

YOUR STUDENTS CAN BORE A HOLE CLEAR THROUGH IN ANY WOOD. A SMOOTH, EVEN JOB FROM TOP TO BOTTOM WITH



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WALLINGFORD - - - - CONN.

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If so, please notify us in time to send the September number to your new address. This will avoid delay and the loss of copies as postmasters cannot forward magazines without additional postage. Your cooperation will be appreciated.

THE MANUAL ARTS PRESS -- PEORIA, ILLINOIS

TRADE NOTES

(*Continued from p. XXV.*)

Gunter, Wagner & Company. They are sole agents for the latter. C. M. Bidwell and A. A. Olson were in charge.

Devoe & Raynolds Company, along with several other firms, were showing especially their tempera colors. This firm, however, furnishes supplies for crayon drawing, water color painting, draughting, pen and ink drawing as well as drawing materials for architects and engineers. E. D. St. John, A. R. Griffiths, and H. D. Jansen, of Chicago, E. R. Brooks, of New York City, and Mrs. S. J. Thalheimer of Kansas City, were in attendance.

A firm that exhibited for the first time in this association was Binney & Smith of New York City. Miss Marie Falco and S. Vere Smith were in charge. Their exhibit consisted of a full line of crayons, colored chalks and drawings, the latter covering both school and professional work.

WOOD FINISHES

No firm is better known in the wood finishing field than S. C. Johnson & Son. Their exhibit was arranged to represent a pergola, and this gave it a very inviting effect. The background consisted of beautiful panels of stained wood. They were distributing their new booklet, "Proper Treatment of Floors, Woodwork and Furniture." Many visitors were interested in the samples of parquetry shown. They have been manufacturing this for years, and manual training teachers have secured samples to show their students how this work is done. George E. Thompson and Miss F. Jelliffe were in attendance.

George A. Ross, of Lewis Institute, Chicago, has put on the market a new Arts Craft finishing and polishing wax, and in his exhibit were samples of wood finished with this wax. It gives a soft velvety gloss, and can be applied, wiped off, and polished in about fifteen minutes.

(*Continued on p. XXIX.*)

SANI STEEL TABLES
for DOMESTIC SCIENCE
and
BENCHES
for MANUAL TRAINING
WRITE FOR CATALOGUE

COLUMBIA SCHOOL SUPPLY CO.
INDIANAPOLIS - - INDIANA

NOW IS THE TIME TO LOOK INTO THE MERITS OF

Educational, Vocational Manual Training Supervisors and Instructors should write for free samples and prices.

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NALA (THE) RULE
A Legible, Accurate Drawing Rule

NOW
is the time to consider Summer and Fall needs in
MANUAL AND VOCATIONAL
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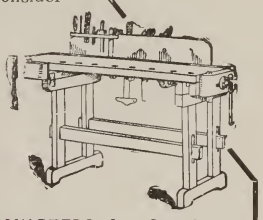

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BUY OF THE MANUFACTURER
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Appointments confidentially and effectively negotiated for instructors desiring high grade positions in Universities, Colleges, Normal Schools, High Schools, Graded and Private Schools, Engineering and Commercial Branches; Music, Art, Physical Training and Domestic Science.
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A. P. Goddard, Mgr., Y. M. C. A. Bldg., Chicago

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Kindergarten, Manual Training and Vocational goods of all kinds.
Also Bradley's Water Color Paints, the best in the world.
Address, THOMAS CHARLES CO., 207 Michigan Ave., CHICAGO

TRADE NOTES

(*Continued from p. XXVII.*)

ART CRAFTS SUPPLIES

The field of art craft supplies is a wide one, but by specializing in a given craft a firm can furnish the best goods obtainable. In these days when art craft jewelry is so popular, visitors were indeed glad to make the acquaintance of Espositer, Varni Company of New York City. The exhibit, which was in charge of Stephen Varni, contained about $25,000 worth of precious and semi-precious stones. The main purpose was to show how inexpensively genuine stones can be bought for school and craft workers' uses. One group of 50 genuine stones ranged in price from 10c to 50c; another group from 50c to $1.00. All interested in this work were glad to receive the copy of "A Guide for Gem Buyers" which was distributed.

In the Lewis Institute exhibit the emphasis was placed on pottery making and the equipment necessary for the work. A large number of finished pieces were shown in addition to many colors of glazes and a small potter's wheel. Judson T. Webb, head of the pottery department at Lewis Institute, was in charge.

The Waldcraft Company, Indianapolis, showed non-drying color pads for stick printing, block printing and stenciling, a set of eight bottles of opaque water colors, and a series of model and costume charts.

SCHOOL ROOM DECORATION

At no other convention of this association were there so many firms displaying school room decoration materials. It shows that this worthy subject is receiving the attention that it deserves. One of the best known firms in this field is The Elson Art Publication Company. They had a beautiful exhibit in which were shown reproductions made direct from originals, showing exact values in light and shade. These reproductions were made by permanent processes, such as photogravure, carbon photograph and copper-plate printing, and are veritable facsimiles of the originals, being true to color and value. George B. Heath was in charge of the exhibit.

(*Continued on p. XXXI.*)

ARTS CRAFT
FINISHING AND POLISHING WAX

The Wax Finish for the School Shop
Artistic Sanitary Lasting

Arts Craft Wax is made from the very finest materials and contains no paraffine or beeswax. Will not get sticky or tacky in a warm room or in warm weather. Can be used either on the bare wood, or on stained or filled surfaces.

Arts Craft Wax will be delivered by parcels post at the following prices: For 1 pint can 50 cents. For ½ pint can 30 cents. For ¼ pint can 15 cents

Special prices on larger quantities.

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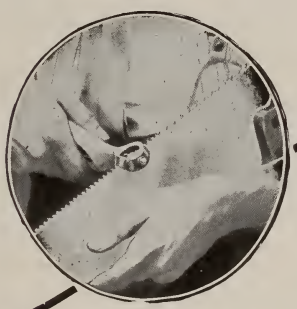

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One hundred and thirty-five of them installed during 1914. We know of that number; perhaps as many were bought of which we have no record. Every school needs this splendid educator. A school without it is not doing its best possible work. An addition to the school which bustles with knowledge, which gives delightful and useful employment and which makes manly boys is what all educators seek. It is found in the **Printing Office.**

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WOODWORK

FOR

SECONDARY SCHOOLS

CARPENTRY

Two New Books by Professor Griffith

Ready this summer in time for Fall adoption

THE first of these is a textbook for high schools, colleges, and technical schools. It provides in text form, the essentials of woodwork as taught in the best secondary schools. It presupposes a knowledge of elementary tool processes as usually taught in grammar grade courses. It is not an exhaustive treatment but is sufficiently complete to answer every requirement for student's use and is free of the large amount of related matter which is not vital to a high school course. It is the first well balanced and successful treatment of woodworking for secondary school students only. Among the distinctly new features in this text are chapters on the use of woodworking machines, carving, and inlaying, and furniture construction. It also contains chapters on woods, tools and processes, joinery, turning, wood finishing and pattern-making. In the preparation of this book, Professor Griffith has been assisted by men having had special experience in the several lines of work, thus combining to make it a well balanced students' text and authoritative as well.

"CARPENTRY" is intended for use in vocational schools, trade schools, technical schools, and by apprentices to the trade. It presents the principles of house framing in an exceptionally clear and fundamental way. It contains the following chapters: I, Foundations; II, Main Frame; III, Roof Frame—Square Corner Building; IV, Roof Frame—Any Polygon; V, Exterior Covering and Finish; VI, Interior Finish; VII, Estimating. To these will be added an appendix treating of (a) natural trigonometric functions; (c) other useful tables having to do with lumber, nails, screws, girder sizes, etc.; (d) short cut to roof framing; (e) estimating excavations, masonry, slate, plaster, painting. The book is an admirable combination of practical experience and mathematical and constructive principles based upon sound pedagogy.

Both books are abundantly illustrated with line drawings and photographs made especially for them. They show details, tools, tool processes, methods of work, and the many photographs "really illustrate" actual work in progress.

Send for descriptive circulars and be sure to consider these books for fall adoption.

THE MANUAL ARTS PRESS, Peoria, Illinois

TRADE NOTES

(*Continued from p. XXIX.*)

The Home and School Art Shop, Chicago, specializes in pictures in color, classified under figures, landscapes, architecture, kindergarten, and manual training. School exhibits of their pictures can be arranged for and they will gladly furnish particulars to those interested.

Nearly everyone is more or less familiar with the Emery Prints, which cover photographic reporductions of painting, sculpture and architecture by eminent artists of the past and present. These prints in sepia color and canvas color, together with suitable frames can be purchased of Brown-Robertson Company, New York. They also handle the Riviere Color Prints, original wood blocks by Henry Riviere of Paris. The catalog which this firm distributes is one which should find a place on every teacher's book shelf.

ELEMENTARY HANDWORK SUPPLIES

There is one firm which always comes to mind when we seek a place to buy elementary handwork materials, and that firm is Thomas Charles Company. They have an acquaintance in this Middle West which covers many years, and their relations with the school people have always been very cordial. In addition to handwork materials, they showed a complete line of Bradley water Colors and tempera colors. Their representatives included Wm. T. Dix, E. H. Ellwood, W. H. Matheny, H. W. Nott and H. J. Mac Neill.

PUBLISHERS

If the publishing interests were not represented at these conventions, visitors would indeed miss a great opportunity. It is the one time when teachers can make the acquaintance of the latest books and learn about forth-coming books.

Visitors were interested in the announcement of Atkinson, Mentzer & Company that on October 1 they would publish "Applied Drawing" by Harold Haven Brown, director of John Herron Art Institute, Indianapolis. This book is for high and normal school use. Advanced pages of the book were shown. In their exhibit were

(*Continued on p. XXXIII.*)

Correlated Courses

in Woodwork and Mechanical Drawing

By IRA S. GRIFFITH

Professor of Manual Arts, University of Missouri

A manual training teacher's every-day helper. It was designed to meet the needs of the teacher of woodworking and mechanical drawing for reliable information concerning organization of courses, subject matter and methods of teaching. It covers classification and arrangement of tool operations for grades 7, 8, 9 and 10, shop organization, allotment of time, design, shop excursions, stock bills, cost of material, records, shop conduct, the lesson, maintenance, equipment, and lesson outlines for grammar and high schools. In fact it is the most comprehensive treatment of the subject of teaching woodworking ever published. The author is an expert workman who has been a successful teacher and supervisor of public school manual training. It is based on sound pedagogy, thoro technical knowledge and successful teaching experience. PRICE $1.50.

IT IS PRACTICAL

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1915

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Your requirements for a course in this subject are embodied in

Applied Mechanical Drawing
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By Holton

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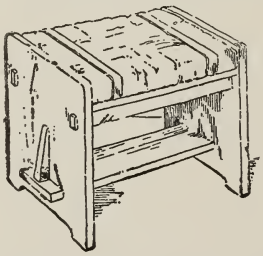

PRACTICAL SUGGESTIVE HELPFUL

A companion volume to "Problems in Furniture Making" by the same author. The book contains plates showing perspective drawings of typical designs representing particular types of furniture accompanied by suggestions for rearranging of parts, and modelling of parts. Altogether twelve types of furniture are represented with modified designs, and practical helps on each type. It also discusses and illustrates principles of design, as applied to furniture in a very helpful way, and gives tables showing the important dimensions of typical articles of furniture as used in commercial shops. As a book of practical help on the designing of simple pieces of furniture it stands unique.

Price, postpaid, $1.00
THE MANUAL ARTS PRESS, PEORIA, ILL.

HANDICRAFT FOR GIRLS

By IDABELLE MCGLAUFLIN
Supervisor of the Girls' Handwork in the Denver Public Schools.

A Course of Instruction and Manual for Teachers

A practical book on sewing for girls in grades three to eight. It outlines a tentative course in needlework, basketry, designing, paper and cardboard construction, textile fibres and fabrics, and home decorations and care. The course is definite enough to be thoroly practical and elastic enough to suit the varied conditions found in schools ranging from a village school to that in a large city. For the benefit of the inexperienced teacher, the course is given in detail and a great number of electives are introduced, making possible and encouraging the exercise of the individual taste of both teacher and pupil. Contains 122 pages with many halftone illustrations of processes and completed work.

Price, postpaid, $1.00

THE MANUAL ARTS PRESS
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TRADE NOTES

(*Continued from p. XXXI.*)

some Rhine prints framed for school room decoration, in addition to industrial materials and their "Applied Arts Drawing Books." E. E. Bush and C. J. Hoebeke were in charge.

Scott, Foresman & Company have just published "Elementary Drawing" by Mabel B. Soper, Director of Art, State Normal school, Bridgewater, Connecticut, and "Mechanical Drawing" by Philip W. Hutton. This firm has published for several years the course in art for the elementary grades of the Chicago public schools, but only recently has the privilege of selling these outside of Chicago been allowed. This wider sale will mean much to them as publishers. "Antique Buildings" by Harry W. Jacobs, and "The New Educational Course in Constructive Design" by Edith Phelps and Mable Arbuckle are two of their late books. J. A. Stevenson was in charge of the exhibit.

A firm exhibiting for the first time was G. Broes Van Dort Company, Chicago. Visitors who did not have time to examine their books carefully really missed a pleasurable and profitable opportunity. Their specialty is imported architectural and industrial art publications. They are the American and Canadian distributors for "Raguenet, Materials and Documents" covering architecture and sculpture in 14,000 executed details. In their exhibit were many books rarely found except in public libraries, and one could well spend several hours with them.

The most comprehensive publishers' exhibit was that of The Manual Arts Press. It covered books on every phase of the manual arts, in addition to the many allied subjects. Laurens L. Simpson and Arthur B. Block were in attendance.

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will accept a position for coming school year. College graduate. Three years of experience in teaching printing with a science.

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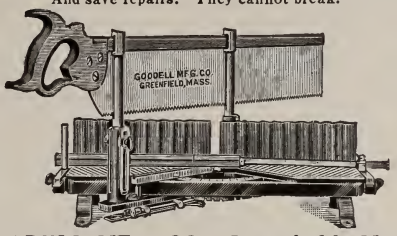

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By CHAS. M. MILLER

The Kite Man of California

A VALUABLE BOOK FOR BOYS

KITES — AEROPLANES — TOURNAMENTS

A comprehensive and reliable treatment of kites and kite flying. Mr. Miller, the author, has made a wonderful success of kite flying in the schools of Los Angeles, California, for a number of years past. This book is the result of his work. It deals with general kite construction; tells how to make all kinds of kites and how to fly them; describes kite accessories and how to decorate kites; describes the construction and use of moving devices, messengers: suspended figures and appliances, balloons, and parachutes.

Four chapters treat of aeroplanes, gliders, and model aeroplanes, together with one on propellers, motors, etc.

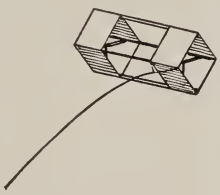
Well illustrated with over 267 drawings and photographs. . . . . Postpaid $1.00

THE CONSTRUCTION AND FLYING OF KITES

By the same author.

Contains 22 illustrations, including 7 full-page plates of drawings of kites—over 40 kites shown. Details of construction given.

Postpaid 20c.



THE MANUAL ARTS PRESS

PEORIA, ILLINOIS

Ink all curves with a compass. Find the centers with a

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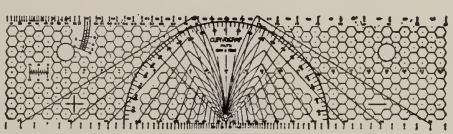

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He has made this a book for the student, apprentice and moulder. It begins with the simplest type of mould, leads through the more difficult work in green and dry sand and loam, includes the subjects of cupola practice, mixing and melting, cleaning and repair of castings and such other matters as the student of foundry work should be acquainted with.

You will be interested in this book and can obtain an examination copy as per the terms below.

322 pages, 5 1-4x8, 154 figures. Cloth, $2.00 net.

The Following Books Are Now In Press

Will be ready in the Summer, 1915.

Enter your order now for copies to be sent when published.

Mathematics for Machinists

By R. W. Burnham, Instructor, Evening Machine Classes, Pratt Institute, Co-ordinator in Co-operative Work, High Schools.

200 pages, 175 figures. Cloth, $1.25 net.

Arithmetic for Carpenters and Builders

By R. Burdette Dale, Department of Engineering Extension, Iowa State College.

180 pages, 4¾x7, 109 figures. Cloth, $1.00 net.

Alternating Current Electricity—Course II

And Its Applications to Industry.

By W. H. Timbie, Wentworth Institute, and H. H. Higbie, University of Michigan.

Practical Shop Mechanics and Mathematics

By J. T. Johnson, Superintendent State Trade School of Bridgeport, Conn.

Market Gardening

By F. L. Yeaw, formerly Professor of Market Gardening, Massachusetts Agricultural College.

Furnishes usable information regarding the growing and marketing of the common vegetables

Decorative Design

By J C. Chase, Illustrator, and Teacher at the College of the City of New York, and at Cooper Union.

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BOOK NOTES

The Manual Arts Press has received a great variety of requests and suggestions from men who have wished to get extra copies of some of the drawings published in the Shop Notes and Problems department of this magazine. They have wanted extra copies of certain plates for class use. They have been unwilling to mutilate their own copy of the magazine to get one copy, and even if that were done, it would not meet the need. They have been too busy to make new tracings and they could not afford to pay for extra copies of the magazine. One effort to meet this demand was the publication of *Selected Shop Problems* by Seaton. This met the demand in part, but it did not meet the needs of the teacher who wanted 100 copies of one problem and none of the next two. This year another plan has been decided upon. Thirty of the most desirable of the problems have been selected and printed on tracing paper ready for blueprinting. They are placed in a stiff paper holder and this in an envelope, on the outside of which is a list of its contents. The collection is sold at 25 cents under the title *Shop Problems*. If the plan is a success in meeting the needs of teachers a similar collection will be issued at the end of each volume.

The third edition of Greene's *Workshop Notebook* is being printed. This will contain a page telling the pupil what to do in case of an accident.

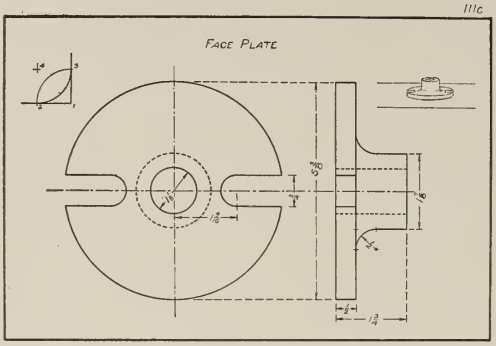
The McGraw-Hill Book Co. has just published a book on *Elementary Mechanical Drawing* by Charles W. Weick, assistant professor of drawing and design, Teachers College, New York City. It is a book of 250 pages, and is intended to be used as a text-book on modern conventions, theory and practice. One's first impression of the book is that the author's treatment of theory is full and clear, tho emphasis seems to be placed upon practice. The general plan of treatment of this part of the book is to show a plate on each right-hand page and directions for the drawing of the object on the opposite page. The plate is in two parts; one part shows the completed drawing, and the other shows lines which should be drawn first in making the drawing. The technique of the plates is good.

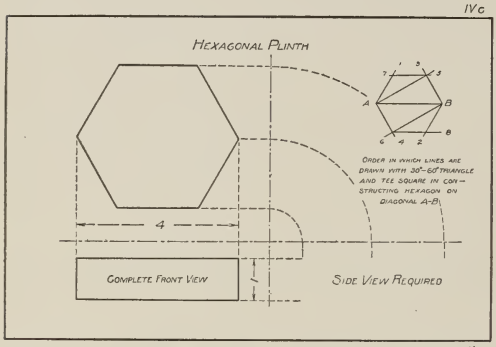
Some of the drawings and photographs to be used in the two new books by Professor Ira S. Griffith were shown in the Manual Arts Press exhibit at the Western Drawing and Manual Training Association held in Chicago, May 5th to 8th. For *Woodwork for Secondary Schools* both drawings and photographs were shown; for *Carpentry* only photographs, the drawings not being ready. The display attracted the attention of many teachers of woodworking. The drawings of tools and machines by John R. Frazier deserved the praise they received. They are sure to add much to the clearness and attractiveness of the book for which they have been made.

The A. S. Barnes Company has just issued a second book in the "Vocational Series," of which the first was *Profitable Vocations for Girls* by E. W. Weaver, published two years ago. The present volume is *Profitable Vocations for Boys* by E. W. Weaver, director of vocational guidance in Buffalo and J. Frank Byler, principal of the George Brooks School, Philadelphia. This book aims to provide a brief summary of the available information relating to the conditions for admission to the principal gainful occupations and to present in suggestive forms the methods by which the workers may advance themselves.

There are very few books which have proven so near universally helpful to manual training teachers as *Problems in Furniture Making* by Professor Fred D. Crawshaw. His was one of the first books, dealing with this subject for manual training teachers. The book is being used in manual training shops everywhere, and the sixth edition has just been published. Among the very helpful features is the chapter on "Finishes" which describes more than 15 finishes appropriate for furniture, and adapted to manual training school shops.

PROBLEMS IN MECHANICAL DRAWING

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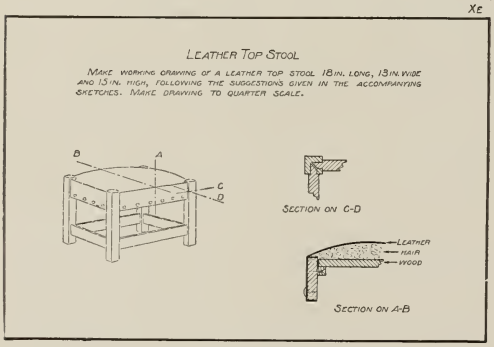
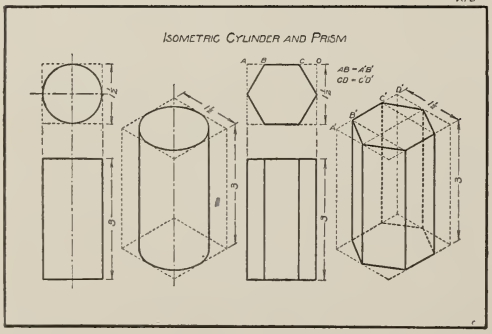
HEXAGONAL PLINTH
ORDER IN WHICH LINES ARE DRAWN WITH 30°-60° TRIANGLE AND TEE SQUARE IN CONSTRUCTING HEXAGON ON DIAGONAL A-B
COMPLETE FRONT VIEW
SIDE VIEW REQUIRED


X ε
LEATHER TOP STOOL
MAKE WORKING DRAWING OF A LEATHER TOP STOOL 18 IN. LONG, 13 IN. WIDE AND 15 IN. HIGH, FOLLOWING THE SUGGESTIONS GIVEN IN THE ACCOMPANYING SKETCHES. MAKE DRAWING TO QUARTER SCALE.
SECTION ON C-D
LEATHER
HAIR
WOOD
SECTION ON A-B



By CHARLES A. BENNETT
Professor of Manual Arts, Bradley Polytechnic Institute
With drawings by FRED D. CRAWSHAW
Professor of Manual Arts, University of Wisconsin

TEACHES STUDENTS TO THINK AS WELL AS TO DRAW

This book is a collection of problems for the use of students beginning mechanical drawing. It is a result of years of experience in teaching the subject and in directing others in such teaching. Altho intended essentially to cover the ground of a first-year high school course, the first part of the book is not too difficult for pupils of the upper grammar grades if the inking be omitted.

The accompanying illustrations show four of the plates, of which there are 88, showing 82 problems. The problems are arranged in groups, each presenting an important division of the subject. In each group the problems are arranged approximately in the order of their difficulty of solution. The proper sequence so necessary for successful instruction in mechanical drawing is an important feature of the book. With but few exceptions the problems are presented in an unsolved form with a skilfully arranged balance between the part given and the part required. Thus copying from the text is prevented and students are forced to develop their powers to think in the graphic language as well as to use pencil and instruments. The problems are both theoretical and applied, and include working drawings, orthographic and isometric projection, revolution, developments and intersections.

The wide variety, the skilfull arrangement and the natural human interest make it a fascinating course to the student. The book has been adopted and is in successful use in high schools and normal schools and has come to be looked upon as the standard beginning text. Loose leaf and bound in board covers.

PRICE, POSTPAID, $1.00.
Discount in Quantities.

THE MANUAL ARTS PRESS - Peoria, Illinois

SHOP PROBLEMS ON TRACING PAPER

READY FOR BLUE PRINTING

(IN PRESS)

SHOP PROBLEMS by Albert F. Siepert, is a new departure in helps for teachers of the manual arts. It is a portfolio of plates, working drawings of projects printed on tracing paper and adapted to be blue printed for students use. The plates are taken from the Shop Notes and Problems department of *Manual Training and Vocational Education* of the present volume.

The problems include a wide variety, many until published in the magazine were entirely new and all are of good design. There are thirty projects varying from a simple tray to an extension dining table. The list includes the following:

Fern Stand
Wondergraph
Nail and Screw Tray
Farm Gate
Pedestal
Dresser Set
Milking Stool
Towel Ring
Equalizer Jack
Costumer
Pulley
Sconces
Coop
Dining Table
Hand Wheel
Foot Stool
Library Tables
Work Bench
Porch Swings
Taboret
Cold Frame
Forcing Box
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Typewriter Stand
Reading Lamp
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Send your order now and receive one of the first copies off the press.

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THE MANUAL ARTS PRESS, PEORIA, ILL.

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AFTER HOURS

SUMMER OUTING FOLDERS.

AS I grow older I believe I am getting hardened to the allurements of life insurance literature, but I haven't tried to discover why this is so. At the same time I am fully conscious of the fact that I am just as sensitive as ever to the allurements of the summer outing folders. They fire my imagination, especially when well printed in colors, as so many of them are this year. Any man who can examine the attractive booklets advertising the Panama-Pacific Exposition and not go to California this summer certainly has great power of self-control or a very lean pocket-book.

For instance, there is the large double folder issued by the Remington Typewriter Company with its painting of Balboa framed in mahogany for the front cover. Inside are colored pictorial maps of the Panama Canal, the state of California, the metropolitan district of San Francisco, the exposition grounds, and three maps of the world, one showing routes of travel now that the canal is in use, one winter belts of temperature, and one summer belts of temperature. Of course the latter shows what a delightfully cool place California is in the summer—as cool as Sweden or Hudson Bay or even, along the coast, as cool as the best part of Alaska. And then there are the charming color process prints of a bit of Monteray Bay, children playing on the beach near Seal Rocks, the Golden Gate at sunset, and many more.

Then by way of contrast, but hardly less appealing, even tho the colors are omitted, is the bulletin on "Central California, Pleasure Land for the Tourist" issued by the Tourist Association "for the stranger within our gates." It shows out-door theatres, out-door sports, big trees, old missions and the Yosemite National Park. Then there are drives bordered by palms, pepper trees and eucalyptus trees, fields overspread with broad-reaching live oaks, orchards in bloom with valley and mountain beyond, wide vineyards fringed with foot-hills, picturesque cypress trees, fields of sweet peas as large as a Dakota farm, beautiful stretches of ocean beach with serf-breaking rocks beyond, the Knife Blade rock 1800 feet high, the great El Capitan in the Yosemite, and the serene and charming Lake Tahoe. Who will be able to resist California this summer?

But Oregon makes a similar appeal. Scarcely less enticing and more beautiful in design is the booklet "Oregon the Land of Opportunity" published by the Portland Chamber of Commerce. Apples and apple orchards of the Hood River country, grapes and roses and fields of grain, the famous Willamette valley, Mount Hood and the Columbia river—all are shown in color, and suggest a land of peace and plenty as well as of opportunity.

And Colorado wants everybody to come thru the mountains. The Denver and Rio Grande Western Pacific Railway sends a yard and a half of "Panoramic Views" in full color; the Florence and Cripple Creek Railroad a similar collection; and the Missouri Pacific a neat booklet on "Colorado, America's Roof Garden." And Alaska wants us all to come up and see her totem-pole village, her fiords, her mountains, her glaciers and enjoy the finest fishing and hunting imaginable. All this and many other inducements she offers and sets forth their merits in popular folder form. Victoria in British Columbia would welcome us, and show us "a bit of England on the shores of the Pacific," "a city that is different." Her thermometer is set for fifty degrees, and will remain there all summer, at least on the printed folder.

But wehther we yield to the allurements of the California summer outing folders or to the attractions of some summer school circular or to the quiet atmosphere of our own little homes and gardens the After Hours Editor bespeaks for all of us manual arts teachers and all readers of this column a happy and restful vacation. He will call again in September—by your leave.

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